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Management and Integration of Hanford Site Groundwater and Vadose Zone Activities

United States Department of Energy,
Richland Operations Office

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EXECUTIVE SUMMARY

The U.S. Department of Energy (DOE) Richland Operations Office (RL) places a very high priority on the protection of groundwater and the Columbia River from contaminants generated at the Hanford Site. In this regard, RL recognizes a need to develop an effective site-wide strategy to assess the impacts of Hanford Site contaminants in the vadose zone (the geologic area between the land surface and the underlying water table) and groundwater beneath the Hanford Site.

There are significant uncertainties and data gaps in the current understanding of the inventory, distribution, and movement of contaminants in the vadose zone. This information is essential for evaluating the impact of radioactive or otherwise hazardous releases to the environment. In particular, the potential impact of these contaminants to the groundwater and Columbia River needs to be clearly understood.

RL has determined that, in order to obtain a thorough understanding of the potential impacts on the vadose zone, groundwater and Columbia River, discharges and leaks from the high-level radioactive waste tanks must be considered, along with all other relevant contaminant discharges to the vadose zone. While RL has gathered a substantial amount of valuable data on groundwater contamination, much more needs to be done to establish a better quantitative understanding of the vadose zone and the numerous waste sources that have contributed to the existing subsurface and groundwater contamination.

To meet these goals, RL is currently developing an integrated site-wide plan to characterize the Hanford Site vadose zone and groundwater, and to assess all relevant site programs and plans, with the primary objective of protecting the Columbia River. In preparing this plan, RL is committed to several objectives:

- Establish a single integrated groundwater/vadose zone management process for the Hanford Site.

- Identify steps needed to:

    - Establish requirements for all Hanford Site activities to contain contamination and assure protection of groundwater resources and the Columbia River.

    - Establish a broad and thorough approach to understanding transport mechanisms and pathways to the Columbia River.

- Integrate science, research, and technology development, focused on the vadose zone and groundwater remediation, as major components of the Hanford Site's mission.

- Establish a strong and effective independent technical review process, to include participation by a panel of experts from applicable fields of science and technology, by national laboratories, and by the National Academy of Sciences.

- Involve Hanford Site regulators, Tribal Nations, and stakeholders in the development and implementation of the plan.

The overall effort to develop a site-wide strategy for resolving these areas of uncertainty, and for devising actions to mitigate or correct associated environmental problems, includes three phases:

Phase I *Pre-Planning* – Develop the planning approach for management and integration of the Hanford Site vadose zone and groundwater programs.

Phase II *Integration and Formulation* – Evaluate existing Hanford Site programs; identify what gaps in data exist; define the needs, goals, and objectives for an effective new program; set the near-term and long-range priorities for the program; prepare a cohesive plan that reflects this information.

Phase III *Implementation* – Carry out detailed work plans for priority activities in Fiscal Year 1999; refine plans as appropriate.

This document (*Management and Integration of Hanford Site Groundwater and Vadose Zone Activities*) presents the integrated management approach for Phase I. The initial integrated plan will be available by October 1998. Further review and refinements of the plan will be necessary to ensure that the activities proposed in the plan are incorporated into other site budget and planning documents, such as the Hanford Site *Integrated Priority List*.

As part of this strategy, the DOE-RL Environmental Restoration program has established the Groundwater and Vadose Zone (GW/VZ) Integration Project office, which includes staff from the Hanford Tank Waste Remediation System, Waste Management, and Science and Technology programs. Bechtel Hanford, Inc. (BHI) has been assigned lead responsibility as the project management contractor to achieve GW/VZ objectives. Pacific Northwest National Laboratory (PNNL) and Fluor Daniel Hanford (FDH) are key members of the project team, applying significant technical expertise and resources to the effort, and helping to ensure close coordination with site programs, contractors, and other involved entities. PNNL also will play a special role in the effort by providing leadership in science assessment and modeling activities.

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ACRONYMS

ALARA	As Low As Reasonably Achievable
AME	Assistant Manager for Environmental Restoration
ASME	American Society of Mechanical Engineers
BHI	Bechtel Hanford, Inc.
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act*
CRCIA	*Columbia River Comprehensive Impact Assessment*
DOE	U. S. Department of Energy
DWP	*Detailed Work Plan*
DWS	Drinking Water Standards
Ecology	Washington State Department of Ecology
EMSL	Environmental Molecular Sciences Laboratory
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
ERC	Environmental Restoration Contractor
ERDF	Environmental Restoration Disposal Facility
FDH	Fluor Daniel Hanford, Inc.
FSUWG	Future Sites Uses Working Group
GPMP	*Groundwater Protection Management Plan*
GW/VZ	Groundwater and Vadose Zone
IPL	*Integrated Priority List*
LRP	*Long Range Plan*
MOAs	Memoranda of Agreement
MOUs	Memoranda of Understanding
NAS	National Academy of Sciences
OBS	Organizational Breakdown Structure
OST	Office of Science and Technology
PBS	*Program Baseline Summary*
PHMC	Project Hanford Management Contract
PM	Project Manager
PMP	*Project Management Plan*
PNNL	Pacific Northwest National Laboratory
PTS	Progress Tracking System
RCRA	*Resource Conservation and Recovery Act*
RL	Richland Operations Office
ROD	Record of Decision
STCG	Science and Technology Coordinating Group
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TWRS	Tank Waste Remediation System
WBS	Work Breakdown Structure

1.0 OVERVIEW

1.1 BACKGROUND

The U.S. Department of Energy's (DOE) Richland Operations Office (RL) has established and implemented several projects that are actively executing the Hanford Site cleanup mission. These projects, which include facility deactivation, building decontamination and decommissioning, waste site remediation, tank waste retrieval and processing, and solid waste management, have resulted in the accomplishment of many important milestones that support Hanford Site strategic goals. Today, each project continues to work toward its own specific end points.

RL designed these projects to complement each other's individual missions. As a result, these projects rely heavily on one another for support, and in many instances "hand off" to one another as one phase of work completes and another begins. However, with a cleanup mission as complex as that at the Hanford Site, the potential exists for fundamental gaps, overlaps, and inefficiencies to occur among multiple projects.

A key part of RL's management oversight role is to watch for and evaluate such problems, and to resolve them in a timely and effective manner. One situation that is being closely examined by RL managers and contractors involves the characterization and remediation of contaminants in specific regions of the Hanford Site's subsurface soil (the vadose zone) and groundwater, particularly those related to waste sources in the Hanford Site 200 Area.

Tribal Nations, stakeholders, and federal and state regulators have voiced their concerns over the real and potential threats these contaminants pose to the Hanford Site's groundwater and the Columbia River. Recently expressed concerns from these groups point to the following critical needs:

- Participants in the Hanford Site cleanup must align themselves toward common cleanup goals in order to protect groundwater and Columbia River resources.
- Planning and priorities must be oriented toward achievable near- and long-term objectives.
- Actions must be adequately funded and efficiently managed.
- Progress and problems must be openly communicated.
- The overall management process must be accessible to evaluation.
- RL must be accountable for its actions.

RL shares these concerns, and supports the broad consensus that the Hanford Site needs a single plan for management and integration of groundwater and vadose zone (GW/VZ) activities. It is evident that increased management attention must be exerted in order to develop the knowledge

base needed for effective solutions to reduce (or eliminate) the environmental impacts to the vadose zone, groundwater, and Columbia River, and these efforts must infuse sound scientific and technical approaches. Further, the planning and integration of these activities requires active participation by all related RL project organizations, and their respective contractors, as well as Tribal Nations, stakeholders, and regulators.

To meet these goals, RL is currently developing an integrated site-wide plan to characterize the Hanford Site vadose zone and groundwater, and to assess all relevant site programs and plans, with the primary objective of protecting the Columbia River. In preparing this plan, RL is committed to several objectives:

- Establish a single integrated groundwater/vadose zone management process for the Hanford Site.

- Identify steps needed to:

    - Establish requirements for all Hanford Site activities to contain contamination and assure protection of groundwater resources and the Columbia River.

    - Establish a broad and thorough approach to understanding transport mechanisms and pathways to the Columbia River.

- Integrate science, research, and technology development, focused on the vadose zone and groundwater remediation, as major components of the Hanford Site's mission.

- Establish a strong and effective independent technical review process, to include participation by a panel of experts from applicable fields of science and technology, by national laboratories, and by the National Academy of Sciences.

- Involve Hanford Site regulators, Tribal Nations, and stakeholders in the development and implementation of the plan.

In December 1997, recognizing the need for action in these areas, the RL Manager directed the Assistant Manager for Environmental Restoration (AME), and Bechtel Hanford, Inc. (BHI), the Hanford Site’s environmental restoration (ER) contractor, to initiate efforts leading to the integration of the Hanford Site’s various vadose zone and groundwater activities into one cohesive effort. The primary goal is to establish and maintain a site-wide management function that is responsible for identifying, correlating, and coordinating those plans and activities that pose a real or potential impact to the Hanford Site's subsurface soil, groundwater, and the Columbia River.

The span of Hanford Site projects with activities pertinent to GW/VZ concerns ranges from the Tank Waste Remediation System (TWRS) to Waste Management, ER, Spent Nuclear Fuels, Facility Transition, Science and Technology, and Site Infrastructure. Although the technical relevance of certain activities to the GW/VZ scope of interest is more readily evident than others,

the full spectrum of these activities must be reviewed for potential impacts and associated preventive or corrective actions.

The overall site-wide integration effort that began in December 1997 is currently proceeding in the following three phases:

Phase I Pre-Planning	Phase II Integration and Formulation	Phase III Full Implementation
Develop the planning approach.	Organize and establish an integrated project management function.	Carry out the detailed work plans for priority activities in FY 1999.

Figure 1-1 provides a timetable and outline of each of these phases, including scope definition and deliverables, project team participants, key information and guidance inputs, and planning assumptions.

The submittal of this document in February 1998 signifies completion of the pre-planning phase.

1.2 PURPOSE AND ORGANIZATION OF THIS DOCUMENT

The purpose of this document is to describe the GW/VZ Project team approach for (1) achieving effective integration of current and planned site-wide activities; and (2) sustaining management control of that integration. The focus of this document is on scheduled and new FY 1998 tasks, as well as work in FY 1999 and beyond.

Section 2.0 offers background information for understanding the basis of the proposed measures described in this document. This section summarizes the current Hanford Site situation relative to ongoing and anticipated GW/VZ activities, and points out the primary challenges to achieving a successful site-wide integration in FY 1998 and beyond.

Section 3.0 describes the proposed path forward for attaining the fundamental objectives of site-wide integration. Responsibility for managing this integration effort has been assigned to the AME and Bechtel Hanford, Inc.(BHI), and the planned approach is based on the systems and processes used successfully within the Hanford Site ER Project. This section also explains the following:

- The basic approach to organizing and managing GW/VZ work as a project.
- The systems engineering method and logic for integrating related work scope elements among multiple Hanford Site projects.

Figure 1-1. GW/VZ Integration Planning, Phases I, II, and III.

	Phase I — Pre-Planning *12/3/97 — 2/13/98*	Phase II — Integration and Formulation *3/3/98 — 9/30/98*	Phase III — Full Implementation *10/1/98 — 9/30/99*
Scope Definition and Deliverables	• Prepare a plan to: - Revise the Groundwater Protection Management Plan - Develop a Long Range Plan (LRP) - Develop a Project Management Plan (PMP) - Develop an integrated project baseline - Develop a Tribal Government Consultation and Public Involvement Plan • Identify resources required to prepare the plans, through a baseline change proposal • Provide a summary of the project management approach for integrating groundwater/vadose zone activities	• Identify existing site-wide activities that characterize, monitor, predict, or impact vadose zone and/or groundwater contaminant levels or transport • Document and integrate current cost and schedule baselines • Define project mission & vision, initiate process of establishing goals, objectives, and success criteria • Prepare PMP • Prepare Project Specification • Prepare Tribal Government Consultation and Public Involvement Plan • Initiate process to identify planning gaps (new activities, missing integration, near-term activities) • Determine whether new critical work scope needs to be initiated or modified in FY 1998 • Complete Detailed Work Plan (DWP) for FY 1999 – FY 2001 • Issue initial LRP (Draft A), displaying current cost and schedule baselines • Start the process of technical baseline management and integration	• Execute the work scope defined in the FY 1999 – FY 2001 DWP • Complete the process of establishing goals, objectives, and success criteria • Develop long-range priorities for groundwater/vadose zone activities based on goals, objectives, and success criteria • Continue the process of technical baseline management and integration • Conduct baseline estimate reviews • Update the LRP based on priorities and available funding (coordinated with the site-wide Integrated Priority List (IPL) process) • Complete DWP for FY 2000 – FY 2002
Project Team Participants	• BHI planning team, supported by: - FDH - PNNL - DOE-RL	• Assemble and co-locate project management team - BHI - FDH - PNNL - DOE-RL	• Adjust project team to support work scope defined in FY 1999 DWP - BHI - FDH - PNNL - DOE-RL
Key Information and Guidance Inputs	• Letter of direction from L.K. Bauer (RL-AME) to S.D. Liedle (BHI) on Sitewide Groundwater/Vadose Zone Integration, December 1997 • Feedback from DOE Undersecretary Moniz's visit to the Hanford Site, January 1998 • Interviews with regulators, government agencies, Tribal Nations, Congressional delegations, and stakeholders to understand their values and concerns related to groundwater/vadose zone integration, December 1997 – February 1998 • Approved baseline change proposal authorizing funding to complete phase I activities	• Meaningful interaction with related DOE-RL projects, contractors, DOE-HQ, Tribal Nations, stakeholders, regulators, and other agencies and interested parties	• Meaningful interaction with related DOE-RL projects, contractors, DOE-HQ, Tribal Nations, stakeholders, regulators, and other agencies and interested parties
Assumptions	• Work scope not fully defined for phase II or phase III • Authorization to proceed with phase II will be received by 3/3/98	• DOE approves phase I plan without significant changes in scope or direction	• DOE approves FY 1999 – FY 2001 DWP by 9/30/98 • Sufficient funding is available to meet project goals, objectives, and success criteria

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- The overall planning process that will be implemented.
- Plans for enhancing partnering and communications with affected and interested parties.
- Efforts to ensure the GW/VZ Project takes full advantage of known and emerging science and technology, infusing the best approaches, tools, and techniques into problem solving activities and work execution.
- The approach for involving independent technical peer reviews in planning and performing the GW/VZ Project.

Section 4.0 summarizes the scope, purpose, and relationship of the planning and management documents required to support and guide accomplishment of this site-wide integration effort. These documents will define the authority, roles, responsibilities, interactions, and cooperative engagement of the numerous government, contractor, Tribal Nation, and stakeholder entities that will be involved. Annotated outlines of the main plans that are to be developed are included in supporting appendices.

Section 5.0 presents a summary schedule of activities necessary to perform the GW/VZ scope of effort during the remainder of FY 1998. The work that is described will culminate in the issuance of a set of approved project baseline planning documents by October 1998. These documents will provide the initial integrated plan for near- and long-term integration of Hanford Site GW/VZ activities.

2.0 CURRENT SITUATION AND CHALLENGES

2.1 BACKGROUND

For over 40 years the Hanford Site supported United States defense program missions, mainly through the production of nuclear materials. As the nation's first plutonium production center, the Hanford Site was (until the mid-1960s) the largest operational nuclear complex of its kind in the United States.

The Hanford Site covers 1,450 km^2 (560 mi^2) along the Columbia River in south-central Washington State (see Figure 2-1). Over its operational years, nine plutonium production reactors, six major chemical processing facilities, and an extensive supporting infrastructure were built and operated. One legacy of Hanford Site operations involves the expansive inventory of hazardous chemical and radioactive wastes that were stored in surface and near-surface engineered structures, as well as the wastes that were released to the ground.

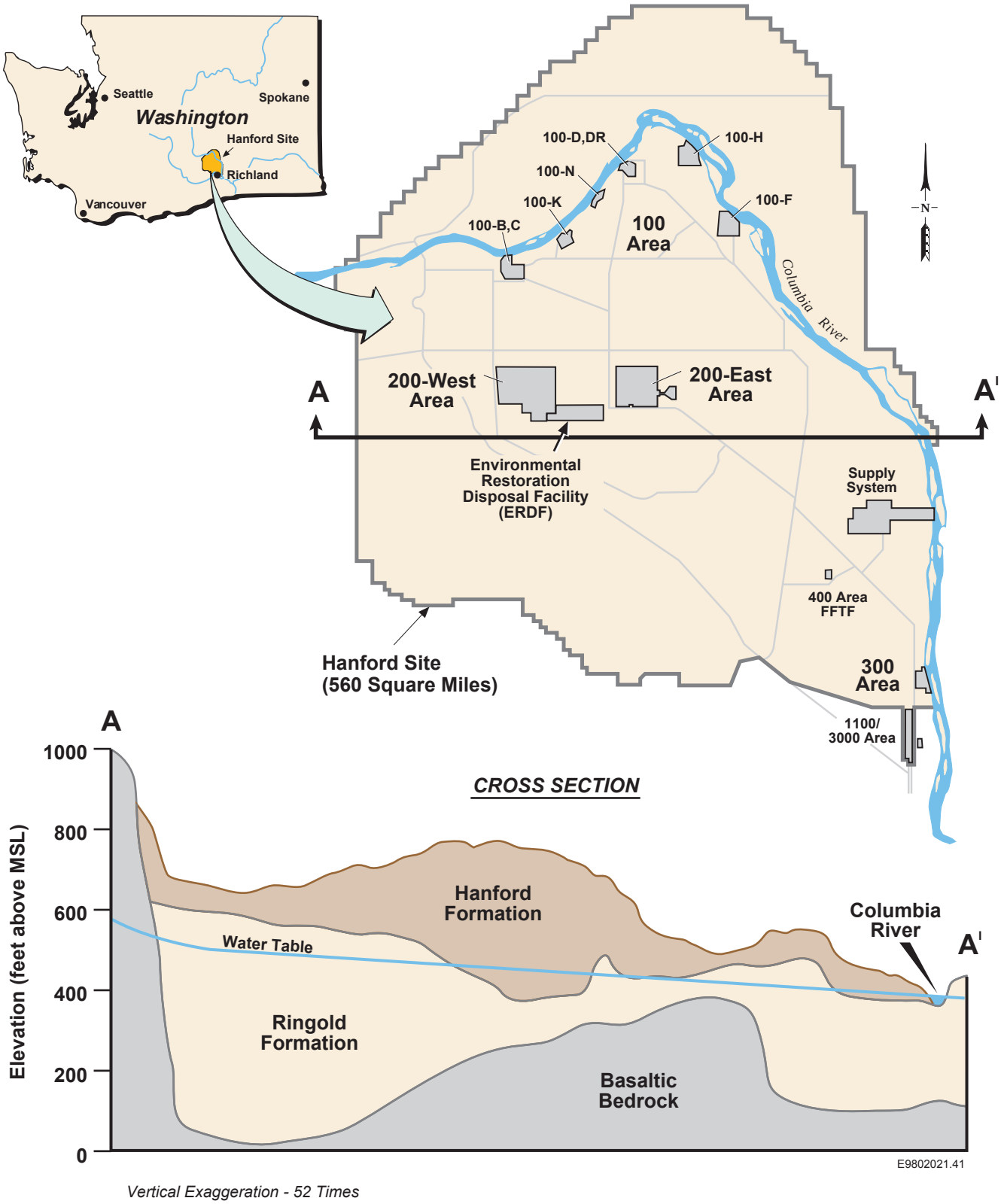
During the Hanford Site's operational history, both planned and unplanned releases of hazardous chemical and radioactive materials were made to the soil on an immense scale. According to current estimates, over 1.7 trillion liters (450 billion gallons) of contaminated liquids were discharged to the ground since 1944, primarily through engineered drainage structures (such as cribs and trenches), but also through ponds and retention basins. The Hanford Site contains over 1,600 contaminated liquid and solid waste sites, and over 500 of these are situated within a half-mile of the Columbia River.

Most of the Hanford Site's inventory of hazardous chemical and radioactive wastes is located in the 200 Areas, within the central plateau region. About 1.3 trillion liters (346 billion gallons) were discharged to the soil in this area. The 200 Areas also contain the Hanford Site's 177 large capacity high-level waste tanks, which together hold approximately 200M liters (54M gallons) and 200M curies of high-level radioactive waste. It is currently estimated that as much as 3.8M liters (1M gallons), containing 1M curies, have leaked from the waste tanks to the underlying soils. Additionally, over 379,000 m^3 (496,000 yds^3) of solid waste, containing an estimated 4.8 million curies of radioactive materials, are buried in disposal trenches in the 200 Areas.

2.2 VADOSE ZONE AND GROUNDWATER CONTAMINATION

The area of underlying soils between the ground surface and the water table comprises the vadose zone. There are two major geological formations in the vadose zone (see Figure 2-1) beneath the Hanford Site. The uppermost of these is the Hanford Formation, which is made up primarily of coarse permeable sands and gravel. The lower geologic unit is the Ringold Formation, which consists of partially cemented silt, sands, and gravel. The vadose zone ranges up to about 90 meters (300 ft) thick in the 200 Areas, and thins to about 20 meters (70 ft) in much of the 100 and 300 Areas of the Hanford Site. The soils of the vadose zone have a low moisture content, except in those areas where liquids (including sanitary waste and permitted effluents) are released to the ground.

Figure 2-1. Hanford Site Location Map, with Major Geological Formations.



A key assumption of the government's waste operations at the Hanford Site was that radioactive contaminants with long half-lives that were released to the ground from planned discharges, leaks, and spills would migrate very slowly in the soil column. However, characterization and monitoring of disposal and storage facilities, sub-surface soils, and groundwater have demonstrated that these releases to the ground have already seriously contaminated the vadose zone and migrated into the Hanford Site's groundwater.

Hanford Site groundwater is primarily situated in the Ringold Formation, which has low to moderate permeability. In some locations, groundwater occurs in the highly permeable Hanford Formation. Past disposal practices have resulted in the contamination, above federal drinking water standards (DWS), of approximately 220 km^2 (85 mi^2) of groundwater beneath the Hanford Site. Identified contaminants include both hazardous chemicals and radioactive wastes. Contaminated groundwater plumes of environmental concern have also reached the Columbia River.

RL has studied and monitored the Hanford Site's groundwater characteristics for decades. Beginning in the 1940s, RL has issued environmental reports from studies that indicated various contaminants were reaching groundwater systems in different vicinities of the Hanford Site. The findings of ongoing groundwater studies are summarized and published annually, and are reported to responsible regulatory agencies. These findings have also been verified through extensive independent technical reviews, and are available to the public.

Recent attention has been focused on the contamination in the vadose zone and groundwater beneath the Hanford Site's single-shell high-level waste tanks. Ongoing *Resource Conservation and Recovery Act* (RCRA) groundwater monitoring activities have indicated that contaminants from the single-shell tanks are impacting Hanford Site groundwater. The contaminants in the vadose zone and groundwater will continue to move due to drainage from rainfall, snow melt, permitted effluent discharges, and other potential sources from Hanford Site operations.

2.3 CLEANUP-RELATED ACTIVITIES

Several of RL's projects are actively addressing Hanford Site GW/VZ contamination issues, including protection of the Columbia River. Many site cleanup efforts are continuing or will be initiated in FY 1998, including the following activities:

- Groundwater pump and treat systems in the 100 Areas, to intercept contaminant plumes.
- Groundwater pump and treat and vapor extraction systems to contain GW/VZ contamination in the 200 Areas.
- GW/VZ monitoring at numerous site locations.
- TWRS vadose zone characterization efforts.

Current Situation and Challenges

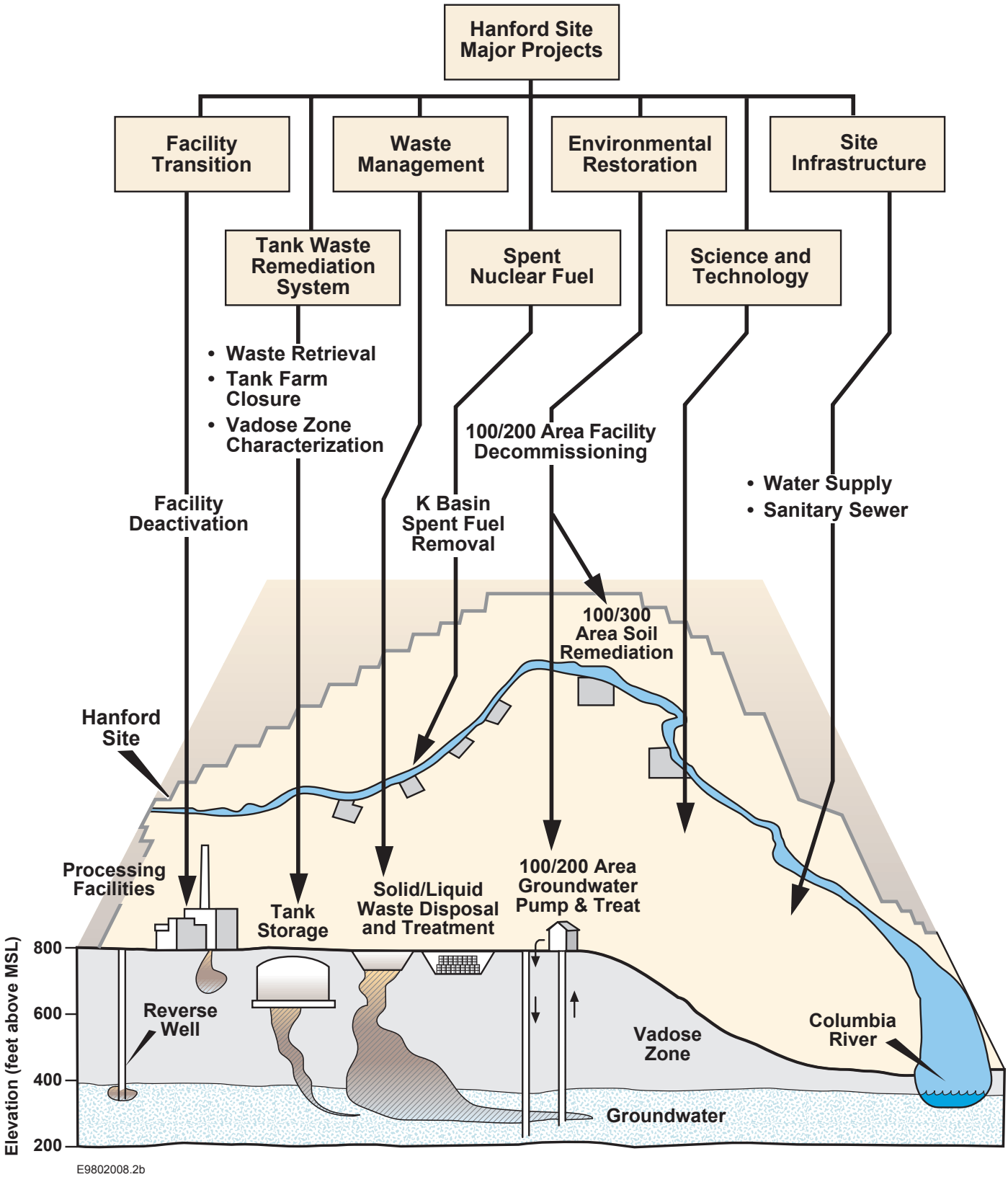
- Excavation and removal of contaminated soils and solid wastes from the 100 and 300 Areas adjacent to the Columbia River.
- Decontamination, demolition, and removal of contaminated buildings, structures, and unsealed wells across the Hanford Site.
- Consolidation of ER-generated waste volumes in the Environmental Restoration Disposal Facility (ERDF).
- Preparations for removal of spent nuclear fuel inventories from the 100-K reactor storage basins.
- Cleanout of spent nuclear fuel storage basins at the 100-N reactor.
- Stabilization of high-level waste tanks in the 200 Areas.
- Composite analysis of low-level radioactive waste disposal in the 200 Areas.
- Remedial action assessment of 200 Area liquid and solid waste disposal sites.
- Site-wide groundwater model integration and initial application.
- Processing of contaminated liquid wastes through effluent treatment facilities (for permitted discharges).
- Pollution prevention and effluent control programs.

Figure 2-2 shows the Hanford Site's major projects and the primary GW/VZ-related activities that are managed by respective project organizations. While each of these projects is designed to help solve larger contamination issues, each project has (to date) functioned in an independent status with separate schedules and baselines.

Examples of two such activities include tank farm vadose zone characterization, managed by the TWRS Project, and the 200 Area Remedial Action assessment, which is conducted by the Hanford Site's ER Project. The intent of both activities is to address vadose zone contamination in and around the 200 Areas. However, each activity was originally planned and is presently being carried out by separate RL and contractor organizations, without defining specific steps to coordinate their objectives and work processes.

The TWRS vadose zone characterization activity is designed to assess subsurface contamination in the tank farms resulting from past leaks and spills. The purpose of this activity is to provide a basis for future tank waste retrieval and tank farm closure decisions that could potentially affect the vadose zone and groundwater. Similarly, the ER Project's 200 Area assessment is designed to characterize vadose zone contamination that is associated with numerous liquid and solid

Figure 2-2. Current GW/VZ Project-Related Activities.



waste disposal sites in and around the 200 Areas vicinity. The purpose of the assessment is to determine the extent to which soil remediation will ultimately be needed.

Both activities require drilling, sampling, and modeling of the vadose zone. By unifying these activities the Hanford Site could realize significant efficiencies, and could obtain a more complete end result by establishing common requirements that could be implemented through a single effort. Identifying and fixing these kinds of work scope overlaps and gaps will be a primary focus of the site-wide integration effort that is described in this document.

2.4 CHALLENGES

RL has developed a good understanding of the distribution and concentration of contaminants in the Hanford Site's groundwater. However, the same concerted effort has not yet been brought to bear on the vadose zone in the vicinity of the Hanford Site's major contamination sources. The Hanford Site has not had a unified strategy for characterizing these at-risk areas, or for assessing how activities and contaminants in the vadose zone may impact groundwater resources and the Columbia River.

Given the huge amounts of contaminants disposed directly to Hanford Site soils, a clear depiction of the types and concentration of contaminants, as well as moisture flow and transport processes in the vadose zone, is a critical need for the overall Hanford Site cleanup effort. Since the primary pathway through which contaminants reach the Columbia River involves the vadose zone and the groundwater underlying the Hanford Site, it is crucial to understand the contaminant burden and the rate at which it could be introduced into the groundwater.

An integrated approach is required in order to understand how pending major cleanup decisions, such as retrieving waste from single-shell tanks, or final remediation of cribs, ponds, and trenches, can be most effectively accomplished with the least possible environmental impact. While there may be divergent views on specific approaches and techniques, there are overriding areas of agreement on what needs to be done. These areas include the following:

- Determination of both current and potential sources of contamination in the vadose zone and groundwater.

- Production of conceptual and numerical geohydrological and geochemical models to describe and analyze contamination locations, as well as flow and transport mechanisms.

- Development of a focused approach for applying science and technology to resolving the complex problems inherent in vadose zone and groundwater characterization, modeling, monitoring, and remediation.

- Identification of corrective measures and remedial actions that can protect the environment and prevent contaminants from entering the Columbia River.

- Establishment of both near- and long-term objectives that are discretely defined and achievable.

- Allocation of adequate funding to manage the work activities efficiently.

- Involvement of Tribal Nations and stakeholders in the development of plans and priorities for vadose zone and groundwater activities.

- Establishment of strong, independent technical peer review processes to help guide and assist the GW/VZ site-wide integration effort.

Numerous requirements, recommendations, issues, and values have been provided by technical reviewers, Tribal Nations, stakeholders, and regulators relative to GW/VZ activities. These include the *Columbia River Comprehensive Impact Assessment* (CRCIA) report. These inputs are being compiled and summarized to ensure that they are being addressed in the roadmapping process.

There are many compelling issues and difficult tasks facing the Hanford Site's GW/VZ Project. The following items summarize the important challenges that the project team factored into development of the management and integration approach that is presented in this document:

- Ensuring that site-wide GW/VZ activities are effectively integrated and aligned with the common purpose of preventing further degradation of the Hanford Site's groundwater resources, while protecting the Columbia River.

- Ensuring sound technology and science are applied to resolve the complex problems inherent with characterization, modeling, monitoring, and remediation of the Hanford Site's underlying soils, groundwater, and the Columbia River.

- Ensuring that Tribal Nations and stakeholder values are incorporated in all cleanup plans and priorities relative to the Hanford Site's vadose zone, groundwater, and the Columbia River.

3.0 MANAGEMENT AND INTEGRATION APPROACH

The management and integration approach for GW/VZ activities will largely be based on systems, tools, and practices that have worked effectively within the Hanford Site's ER Project, but with a broadened scope that addresses integrated planning, decision-making, and communications on a site-wide basis. Figure 3-1 depicts the GW/VZ Project's overall management and integration approach in terms of its four basic components, which are as follows:

- **Organize the project team** by fully integrating the talents, expertise, and knowledge of RL, BHI, Pacific Northwest National Laboratory (PNNL), Fluor Daniel Hanford (FDH), and the Project Hanford Management Contract (PHMC) Team. The project team is the cornerstone of the management approach, because it breaks complex jobs down into manageable pieces with defined scopes of work, along with recognizable start and end points, including assigned milestones and deliverables. BHI functions (i.e., Project Engineering, Systems Engineering, Planning and Controls, External Affairs, etc.) will focus on providing the project team with the support needed for success. This project management approach emphasizes clear delineation of responsibility, authority, and accountability.

- **Formulate the work scope** through application of systems engineering. There are many current projects (i.e. TWRS, Waste Management, ER, Site Infrastructure, etc.) and numerous cross-cutting Hanford Site activities (i.e. characterization, modeling, remedial actions and monitoring) that are working independently to address GW/VZ contamination and protection of the Columbia River. These ongoing activities will be reviewed so as to identify key interfaces, critical work tasks, planning gaps, missing integration opportunities, overlaps, and key decision points. These reviews will determine whether new critical work scope needs to be initiated (or modified) in FY 1998. This determination will be accomplished through application of sound systems engineering principles, early and meaningful interactions with Tribal Nations, stakeholders, and regulators (i.e., to establish mission, vision, goals, objectives, and success criteria), the infusion of science and technology, and through an independent technical peer review process. Formulation of work scope will include regulatory oversight, and will address requirements established by regulations, permits, agreements, DOE orders, and contractual obligations. The GW/VZ systems engineering efforts will interface with the existing Hanford Site Systems Engineering function.

- **Apply planning and controls** processes and tools to define and manage the project's technical scope, cost, and schedule. This component encompasses preparation of a project specification (technical scope definition) and a *Project Management Plan* (management approach, roles, and responsibilities), integrating the project's cost and schedule baselines, establishing a L*ong Range Plan* (LRP), and initiating a detailed work planning process (three-year look-ahead). This approach will result in establishing a basis for work scope identification, budget formulation, work prioritization, life-cycle cost/schedule studies, change control, performance measurement and analysis.

Groundwater/Vadose Zone Integration

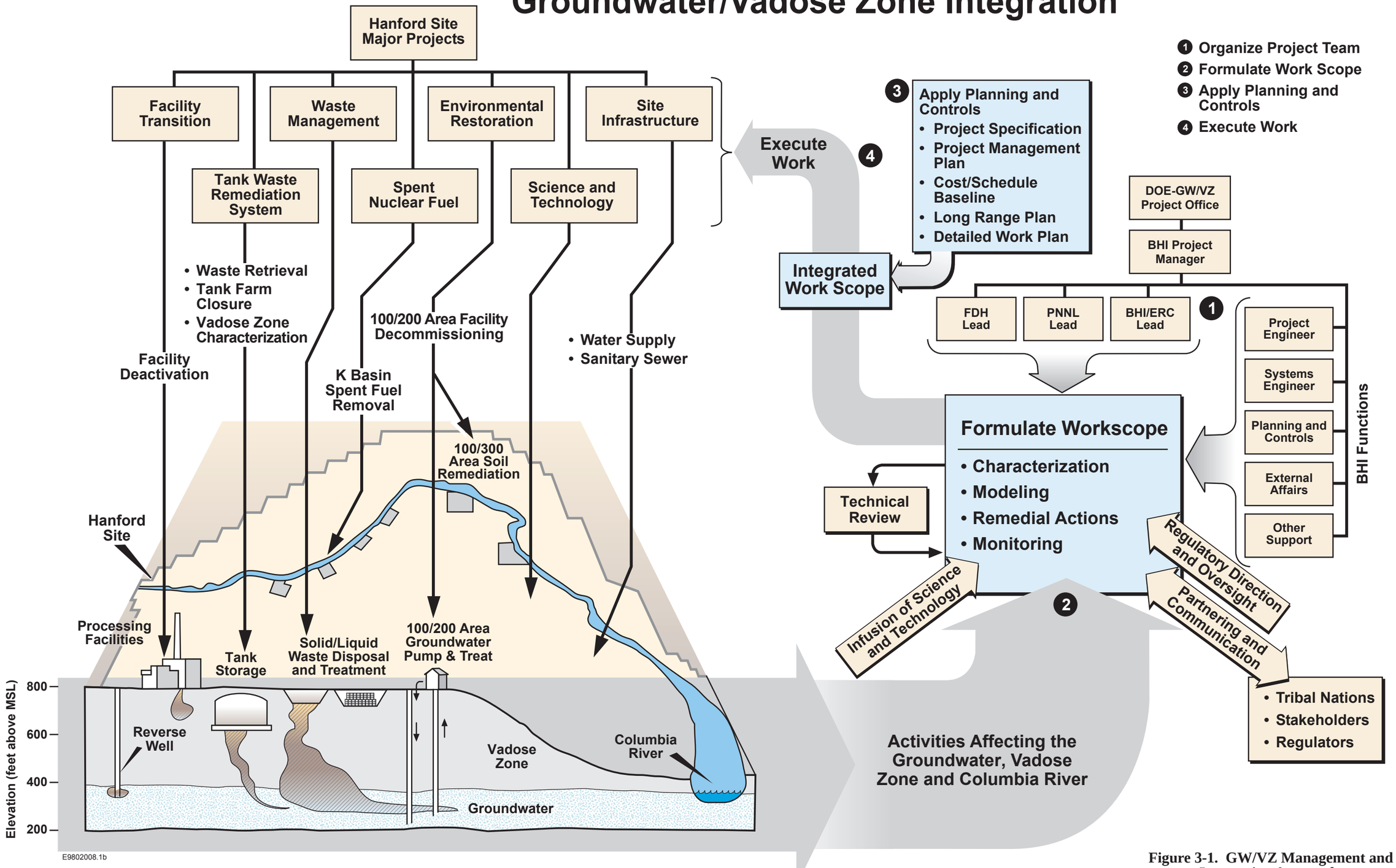


Figure 3-1. GW/VZ Management and Integration Approach.

These tools will be used for management oversight and decision-making, and for meaningful interactions with Tribal Nations, stakeholders, regulators, and the public. Project review meetings will be established to provide the status of particular items, to discuss issues, and to find work-around solutions to any performance obstacles.

- **Execute work** through the existing Hanford Site projects that are responsible for performing the work. As discussed above, there are many ongoing site-wide activities that address GW/VZ contamination and protection of the Columbia River. These activities will continue in FY 1998, along with integration efforts to organize the project team, formulate the work scope, and establish the necessary planning and controls. As GW/VZ technical baselines are fully integrated and understood, planning gaps are examined and closed, and new activities are identified and prioritized, the execution of the work scope will be reviewed to assure that the best technical and management resources are being applied. During project execution, the management of internal and external interfaces is critical to ensuring the adequacy of the actions that are taken. The project team will create a cooperative partnership with other Hanford Site projects, and will encourage early and meaningful interactions with Tribal Nations, stakeholders, and regulators.

3.1 PROJECT ORGANIZATION

3.1.1 Approach

The RL Manager has assigned responsibility and authority to the AME to oversee BHI's management of the integration of those Hanford Site activities and issues associated with vadose zone contamination and groundwater protection. The AME will establish a GW/VZ Integration Project Office for this site-wide function, and this office will be staffed by the AME, TWRS, and other RL personnel. This office will be responsible for identifying and integrating the plans and activities of all Hanford Site projects that currently or could potentially affect the subsurface soil and groundwater.

BHI has been assigned responsibility as the project management contractor in achieving and maintaining these site-wide integration objectives. In this role, BHI is responsible for overall management of the integration effort, which includes defining the integration scope; obtaining necessary resources and assembling the project team; and providing direction to the team for successful completion of the project. The authorities, roles and responsibilities, organizational structure, baseline framework, and management tools and systems to be used by the GW/VZ Project team will be based on the Hanford Site's ER Project approach.

PNNL and FDH are key members of the project team, as each have significant expertise and resources that will be applied to this project. These organizations have been performing significant GW/VZ-related activities, and are currently involved in planning the integration effort described in this document. Both will continue to play active parts in the integration and work execution of GW/VZ activities. PNNL and FDH will assign dedicated resources to the project team, as described in Section 3.1.2.

The enabling authority assigned to BHI will be sufficient to achieve collaboration with other onsite contractor organizations, and to direct the performance of specific support tasks procured by BHI through work orders or subcontracts. As the GW/VZ integrator, BHI will establish and maintain configuration control over the technical baseline. BHI will also influence work priorities, monitor baseline performance, and manage budgets for assigned project activities while controlling baseline changes. These interactions will primarily focus on pertinent activities in the TWRS, Waste Management, ER, and Science and Technology projects, although the activities of other Hanford Site projects will be reviewed for potential inclusion.

3.1.2 Project Team Organization and Staffing

The GW/VZ Integration Project Office will be headed by a DOE Project Manager (PM), who is assigned by and will report to the AME. The DOE PM will be supported by the AME, TWRS, and other RL staff, and will be co-located with the GW/VZ Project team.

The RL Project Office will rely on BHI's project team for technical and administrative support, including any necessary work-ordered services from other Hanford Site contractors, or subcontracted services.

BHI will assign a PM to head the project's contractor organization (see Figure 3-1). The BHI PM will report to BHI's Vice President of Operations, and will interact on a day-to-day basis with the RL Project Office. The GW/VZ Project team will include full-time leads from PNNL, FDH, and BHI/Environmental Restoration Contractor (ERC), who will report directly to the BHI PM. Functional support will be assigned as needed from such BHI departments as Engineering and Technology, Planning and Controls, External Affairs, Safety & Health, Procurement, Contracts, Legal, Controller, Field Support, Administrative Services, and other functions and services necessary to support the GW/VZ Project.

3.1.3 Roles and Responsibilities

RL AME

The AME is responsible for ensuring that Hanford Site GW/VZ activities are integrated into a single planning effort that focuses on minimizing the potential for existing and future vadose zone contamination to impact groundwater and the Columbia River. The RL Project Office will provide required contract direction to BHI, as well as oversight of BHI performance, and will serve as the principal point of contact with external organizations.

The AME's role entails close cooperation with the offices of TWRS, Waste Management, Science and Technology, and other site projects, in order to ensure that respective programmatic responsibilities and milestones that support the site-wide integration effort are clearly understood, correctly prioritized, and successfully met.

The RL Project Office, with support by BHI, will serve as the primary point of contact for Tribal Nations, stakeholders, regulators, citizen's advisory board(s), Congressional delegations, other

state and federal agencies, media, business representatives, and other entities relative to the defined project scope.

BHI PROJECT ORGANIZATION

BHI will report directly to the AME PM, with primary responsibilities in relation to other site entities, as follows:

- Overall project management responsibility and authority for the defined project scope.
- Providing support to the AME's interface with Tribal Nations, stakeholders, regulators, Congressional representatives, media, and other external organizations.
- Partnering with FDH, PNNL, and BHI/ERC to develop and maintain the project baseline management documents (including the *Project Specification, Project Management Plan* (PMP), LRP, detailed work plans (DWPs), and integrated cost and schedule baseline documents).
- Integrated management of GW/VZ technical, cost, and schedule baselines.
- Tracking, monitoring, and reporting performance progress.
- Managing change control.
- Assigning, as applicable, specific support tasks to Hanford Site contractors through purchase orders/work orders.
- Subcontracting for other needed services, as authorized.

HANFORD SITE CONTRACTOR PARTICIPANTS

FDH (PHMC Team), PNNL, and BHI/ERC responsibilities in relation to the GW/VZ Project effort will be as follows:

- Participation in developing, updating, and obtaining concurrence on project plans and associated baseline documentation with respect to the contractor's scope of related activities.
- Assignment of a full-time lead (one each from FDH, PNNL, and BHI/ERC) to the GW/VZ Project team to oversee and coordinate core project activities performed by their respective organizations, and to assist in interactions with other Hanford Site projects relative to GW/VZ integration. The PNNL lead will be responsible for science assessment and modeling activities and for coordinating the participation of other national laboratories in the GW/VZ Project.

- Identification of scope, schedule, and resources needed to perform specific tasks, as requested by the BHI PM.

- For work-ordered services/tasks (ER funded), ensuring receipt of BHI PM authorization before beginning work.

- Acceptance of responsibility for the execution of assigned tasks.

- Efficient management of costs, schedule, and resources for assigned scope in accordance with project baselines and purchase order/work order agreements, as applicable.

- Compliance with performance and reporting requirements established by the AME PM and BHI for the project, in order to maintain accurate indications of work status and trends.

- Provision of early notices to the BHI PM of known or anticipated performance variances; technical issues; safety, health, or environmental problems; regulatory compliance issues; or other issues that might affect performance, cost, or schedule.

- Through each contractor's normal established procedures, providing timely notification to the BHI PM and AME of accidents, environmental releases, or other types of unusual occurrences associated with the performance of GW/VZ-related work.

3.1.4 Project Team Location

The GW/VZ Project team members will be co-located in office space at the Bechtel Richland Corporate Center at 3350 George Washington Way. This arrangement will include space for RL personnel from TWRS and other RL organizations, and the PNNL, FDH, and BHI leads assigned to the project. Co-location, particularly during the initial phases of the project, will enhance teamwork, communication, and focus.

3.2 WORK SCOPE FORMULATION

This section delineates the methodology for integration of FY 1998 GW/VZ activities.

3.2.1 Project Scope Definition

The scope of the GW/VZ Project includes the physical geohydrologic system, as well as the man-made and natural processes that affect the flow of water and transport of contaminants within the Hanford Site's vadose zone and groundwater systems. The project scope includes all geotechnical and geoscience activities that are necessary to protect Hanford Site groundwater resources, and the Columbia River. Groundwater resources at the Hanford Site include the following:

- Surface water that recharges groundwater (including springs, ponds, ditches, lakes, and ephemeral streams).

- Unsaturated soil moisture and local perched water in the vadose zone.

- Saturated sediments and rocks below the water table.

The project scope definition will be refined in the *Project Specification* that is scheduled for completion during Phase II of this plan.

3.2.2 Work Scope Formulation Process

The first step in the work scope formulation process for the GW/VZ Project will be developed as part of the preparation of the *Project Specification*, and will be supported by parts of the *Project Management Plan* and *Integrated Project Baseline*. The *Project Specification* will define the technical basis for the project. It will also (1) establish the project scope, along with goals, objectives, and success criteria; (2) identify regulatory, design, performance, and programmatic requirements; (3) define the existing vadose and groundwater geohydrologic and contaminant conditions; and (4) provide an integrated prioritization logic (see Figure 3-2).

The second step in the work scope formulation process is to define individual work scope tasks. This effort is based on a disciplined system engineering approach, and on the technical scope definition presented in the *Project Specification*. A data quality objective (DQO) process will be used to develop the data requirements for the project work tasks, which will be organized and developed in accordance with the work breakdown structure (WBS) that is presented in the *Project Management Plan*. Examples of key work tasks are characterization, modeling (predictions), remedial actions, and monitoring. Other elements will be defined as the *Project Specification* and WBS evolve during Phase II of the integration effort.

The next step in the work scope formulation process is to establish a clear logic to accomplish work tasks. This requires sequencing and scheduling tasks according to completion times derived from milestone dates in the *Long Range Plan* (LRP). The project work tasks will be established in order to eliminate duplicative and non-critical activities.

The final step in the work scope formulation process is to develop an integrated technical work scope baseline. The technical baseline, along with the cost and schedule baselines, forms a critical element of the overall project baseline. Configuration management of the baseline will be necessary to control changes that will occur to the *Project Specification*, and during execution of the project work, as well as changes that will occur as part of out-year project planning.

3.2.3 FY 1998 Work Scope Integration

In FY 1998, the groundwater and vadose zone work scope has not yet been integrated across the Hanford Site. BHI, PNNL, and FDH (and its subcontractors) are conducting groundwater and vadose zone work scope activities in the 100, 200, and 300 Areas. (In addition, Mactec [a subcontractor] is providing borehole geophysical logging services to RL in the 200 Area tank farms.)

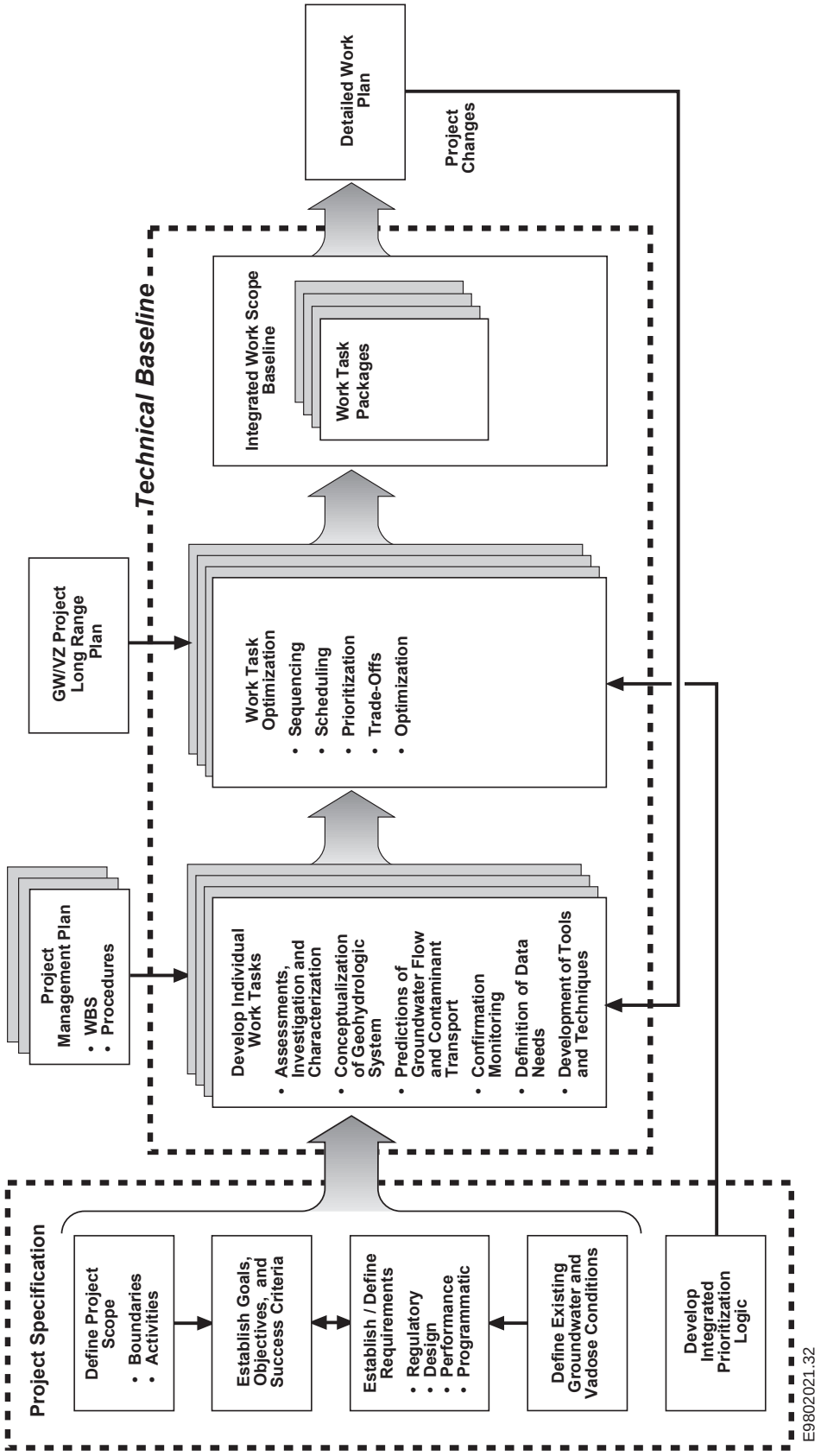


Figure 3-2. GW/VZ Work Scope Formulation Process.

Site-wide integration of the project work scope will occur during Phase II of this planning approach. In this phase key activities of the GW/VZ *Project Specification* will be completed, including a detailed definition of the project scope; the identification of regulatory, design, performance, and programmatic requirements; and the definition of the existing geohydrologic and contaminant conditions of the vadose and groundwater. Other key activities will begin during Phase II, but will not be completed until Phase III. These include the establishment of success criteria and an integrated prioritization logic.

In parallel with the development of the *Project Specification*, the GW/VZ Project team will continue with the FY 1998 work scope in accordance with the approved detailed work plans. This effort will include the following activities:

- Implementation of a systems engineering approach to integrate GW/VZ activities, and to interface with the Hanford Site Systems Engineering function.

- Ongoing work with Tribal Nations, stakeholders, and regulators to develop mission and vision statements for the project.

- Definition and management of cross-project GW/VZ interfaces.

- Management and integration of Hanford Site groundwater and vadose zone monitoring, characterization, and modeling activities.

An analysis will be conducted of the site-wide FY 1998 work scope during Phase II. The analysis will determine which elements of the overall project work scope are included in detailed work plans, and if each work scope element is required by the GW/VZ Project. The analysis will also assess those elements of the project work scope that are not planned, and if new critical work scope needs to be initiated in FY 1998. Previous planning efforts have identified work scope activities that may be critical to providing timely technical information to support Hanford Site projects. The GW/VZ Project team will aggressively seek to identify critical work scope activities that are needed to support acceleration and implementation of the project work scope.

3.3 PLANNING AND CONTROLS

The planning process and control tools implemented through the Hanford Site's ER Project will be used as the framework to integrate and manage the GW/VZ technical, cost, and schedule baselines. This entails reviewing each project's GW/VZ work, challenging what is learned, and then developing the plans that integrate the work that needs to be done. The planning process, as outlined in Figure 3-3, identifies the key steps for accomplishing this review and integration. A summary schedule is included in Section 5.0.

The planning process will result in the following:

- Early and meaningful interactions with Tribal Nations, stakeholders, and regulators.

Groundwater/Vadose Zone Integration - Planning Process

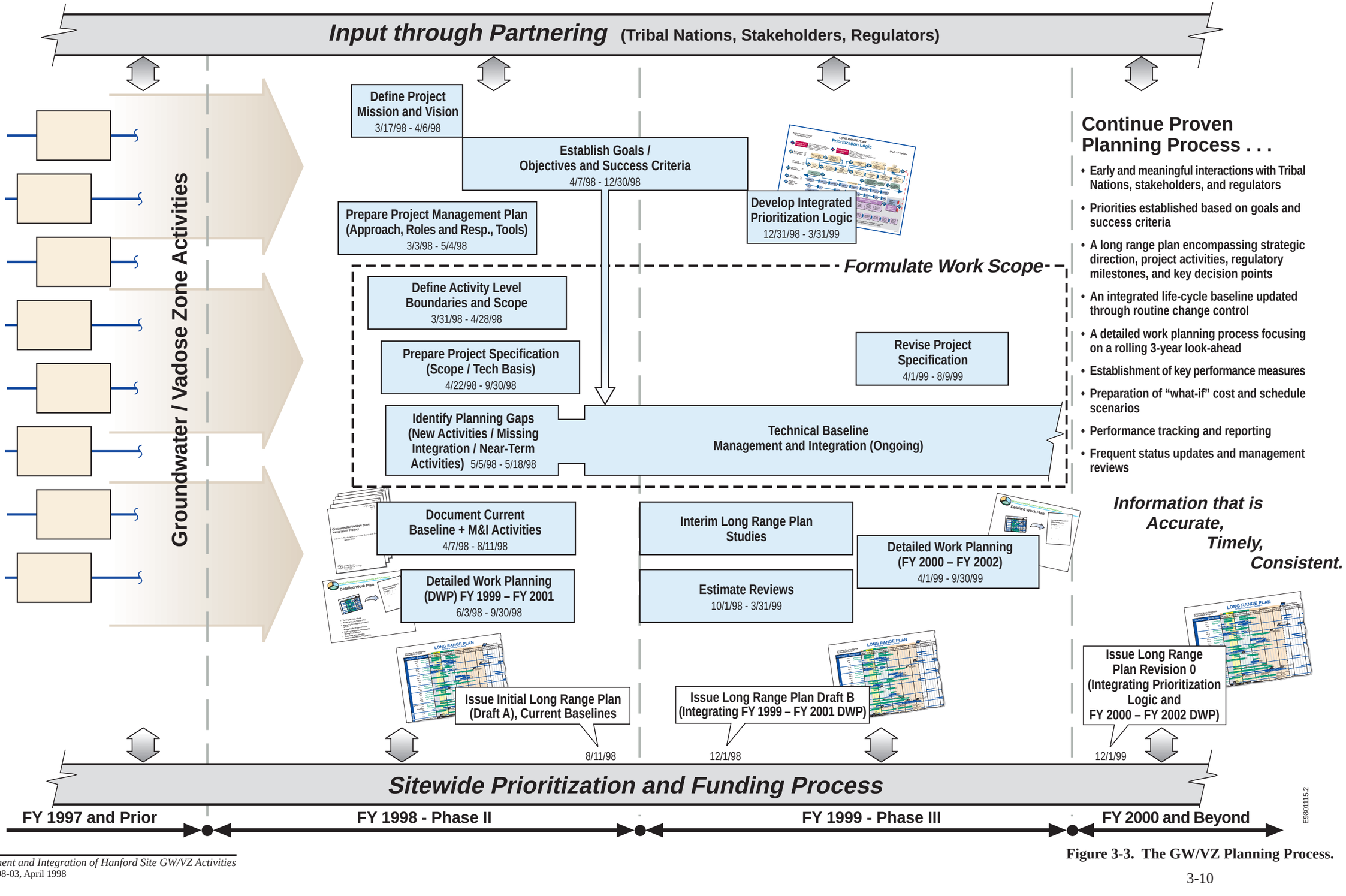


Figure 3-3. The GW/VZ Planning Process.

- Established priorities based on specific goals and success criteria.
- A LRP encompassing strategic direction, project activities, regulatory milestones, and key decision points.
- An integrated life-cycle baseline that is updated through routine change control.
- A detailed work planning process focusing on a rolling three-year look-ahead.
- Establishment of key performance measures.
- Preparation of "what-if" cost and schedule scenarios.
- Performance tracking and reporting.
- Frequent status updates and management reviews.
- Information that is accurate, timely, and consistent.

In FY 1998 the planning process will focus on the following:

- Defining the project's mission and vision, and initiating the process to establish goals, objectives, success criteria, and performance measures.
- Preparing a project management plan that encompasses overall management, organizational roles and responsibilities, and the application of control systems.
- Initiating the work scope formulation process. This entails preparing the project specification, developing individual work scope tasks in accordance with the work breakdown structure, and starting the process of work task optimization. This work scope formulation process will result in ongoing technical baseline management and integration.
- Documenting and integrating the existing project's cost and schedule baselines. This will result in a crosscut or sub-section of the Hanford Site *Integrated Baseline* for GW/VZ activities. The budgets and funding for these activities will reside with the project that is responsible for performing the work.
- Issuing "Draft A" of the LRP, which will be used to document current cost and schedule baselines, and which will form the basis for future revisions.
- Preparing a detailed work plan (DWP) for FY 1999-FY 2001. To provide guidance for detailed work planning, ongoing activities will be reviewed during the work scope formulation process. This will serve to identify planning gaps, missing integration, potential overlaps, and near-term critical activities. Preparations for the DWP will use information

from this process, existing baselines, and feedback from goals, objectives, and success criteria planning. "Draft B" of the LRP will include details of the FY 1999-FY 2001 DWP.

- Initiating project reviews and management level reporting. This includes frequent reviews with the integrated team, focusing on progress versus plan, cost performance, and identification of significant issues requiring management action.

In FY 1999 the planning process will become more defined, and will include the following:

- Completing goals, objectives, success criteria, and performance measures.
- Updating the project specification to reflect the agreed upon goals, objectives, and success criteria.
- Developing an integrated prioritization logic. The prioritization logic results from a process that defines the sequence of work execution. It is used in conjunction with funding guidance, as part of an iterative process, to sequence work on the LRP.
- Continuing the process of technical baseline management and integration.
- Reviewing the project's life-cycle cost baseline. This will entail challenging assumptions, reviewing estimates for reasonableness, ensuring all work scope is included, and eliminating overlapping activities.
- Supporting interim "what if" studies to the LRP based on different work execution scenarios.
- Ensuring work activities affecting the GW/VZ are identified on the Hanford Site's *Integrated Priority List* (IPL).
- Completing detailed work planning for FY 2000-FY 2002.

In early FY 2000, integrated planning and application of control tools will mature to a continuous process. Revision 0 of the LRP will be issued to include the FY 2000-FY 2002 DWP, revisions to technical, cost, and schedule baselines, and meaningful interactions with Tribal Nations, stakeholders, and the regulators.

3.4 TRIBAL NATION AND STAKEHOLDER INVOLVEMENT

Tribal Nations and stakeholders have demonstrated their active interest in GW/VZ activities through such interagency organizations as the CRCIA Team and the TWRS Vadose Zone Partnering Group. These two groups have provided significant insights into GW/VZ issues. Building on the knowledge of these groups, senior BHI management personnel conducted interviews with individuals of the CRCIA Team and TWRS Vadose Zone Partnering Group, as well as with other individuals who have shown a strong interest and concern about GW/VZ issues. A process of one-on-one interviews was arranged to assure a candid exchange of ideas

that is not possible in large groups, or through mixed audience settings. During all interviews BHI representatives placed an emphasis on listening, instead of responding, to concerns. Notes were taken during the interview process and were considered in the development of this document.

A wide array of comments was obtained through this process, and the specific concerns expressed by Tribal Nations and stakeholders are best delivered by individuals from these groups. However, for the purpose of this planning document, it appears that there are several shared expectations about what the GW/VZ integration effort should accomplish. These include the following:

- Protecting the Columbia River to the maximum extent possible from further contamination.
- Integrating activities to ensure a holistic approach.
- Addressing all sources of contamination.
- Minimizing further contamination to the vadose zone and groundwater.
- Developing adequate models of vadose zone contamination and transport mechanisms.
- Involving expert independent technical peer reviews.

3.4.1 Purpose

The purpose of the GW/VZ Tribal Government consultation and public involvement efforts is to engage the Tribal Nations and interested members of the public in a dialogue on GW/VZ issues by creating opportunities to provide early and meaningful input to the integration planning process.

There are two primary goals for the Tribal Government consultation and public involvement efforts associated with the GW/VZ Project. The first goal is to provide communication channels that the Tribal Nations and stakeholders can use to maintain a timely understanding of plans and progress concerning GW/VZ integration issues. The second goal is to identify and develop opportunities where the Tribal Nations and stakeholder groups feel their advisory inputs would most benefit GW/VZ integration activities.

3.4.2 Audiences

Interested audiences include (but are not limited to) state and federal agencies, Tribal Nations, the Oregon Office of Energy, Hanford Advisory Board, Natural Resources Trustee Council, county officials (including Adams, Benton, Franklin, Grant, Morrow and Umatilla counties) community organizations, stakeholders, employees, and other interested public entities.

3.4.3 Tribal Government Consultation and Public Involvement Process

The GW/VZ integration process has adopted, as a fundamental principle, the involvement of Tribal Nations and stakeholders early and regularly with integration activities. Tribal Government Consultations and public involvement forums will have two stages. In the first stage, a process will be developed with Tribal Nations and stakeholders to identify preferred communication channels and to aggressively seek their involvement, values, and advice for consideration in major GW/VZ Project planning components (such as the mission, vision, goals, objectives, mission, success criteria, and the *Tribal Government Consultation and Public Involvement Plan*). Given the diverse audience represented by Tribal Nations and stakeholders, and the proposed planning time frame for the GW/VZ Project, existing government-to-government consultations, presentations to stakeholder groups, and a facilitated workshop appear to be the most viable possibilities for obtaining and reflecting Tribal Nation and stakeholder values in the underlying principles of the GW/VZ Project.

Working with Tribal Nations and stakeholders, a *Tribal Government Consultation and Public Involvement Plan* will be developed for the GW/VZ integration effort. The plan will identify specific involvement opportunities preferred by the external entities. Tribal Nation and stakeholder guidance for other major planning documents will be sought through a facilitated interactive format that will enable interested parties in the Northwest region to provide input. Recognizing that varied input will be received from Tribal Nations and stakeholders, the GW/VZ project team will resolve comments through applicable processes.

The second stage will involve providing updates to Tribal Nations and stakeholders, while seeking input when major documents are revised. Updates will be provided through a newsletter, an Internet web site, and presentations, or through other means identified by specific groups and the GW/VZ Project.

3.4.4 Responsibilities

The GW/VZ Project team will perform the GW/VZ Tribal Government consultations and public involvement activities in conjunction with the RL Office of External Affairs.

3.5 INFUSION OF SCIENCE AND TECHNOLOGY

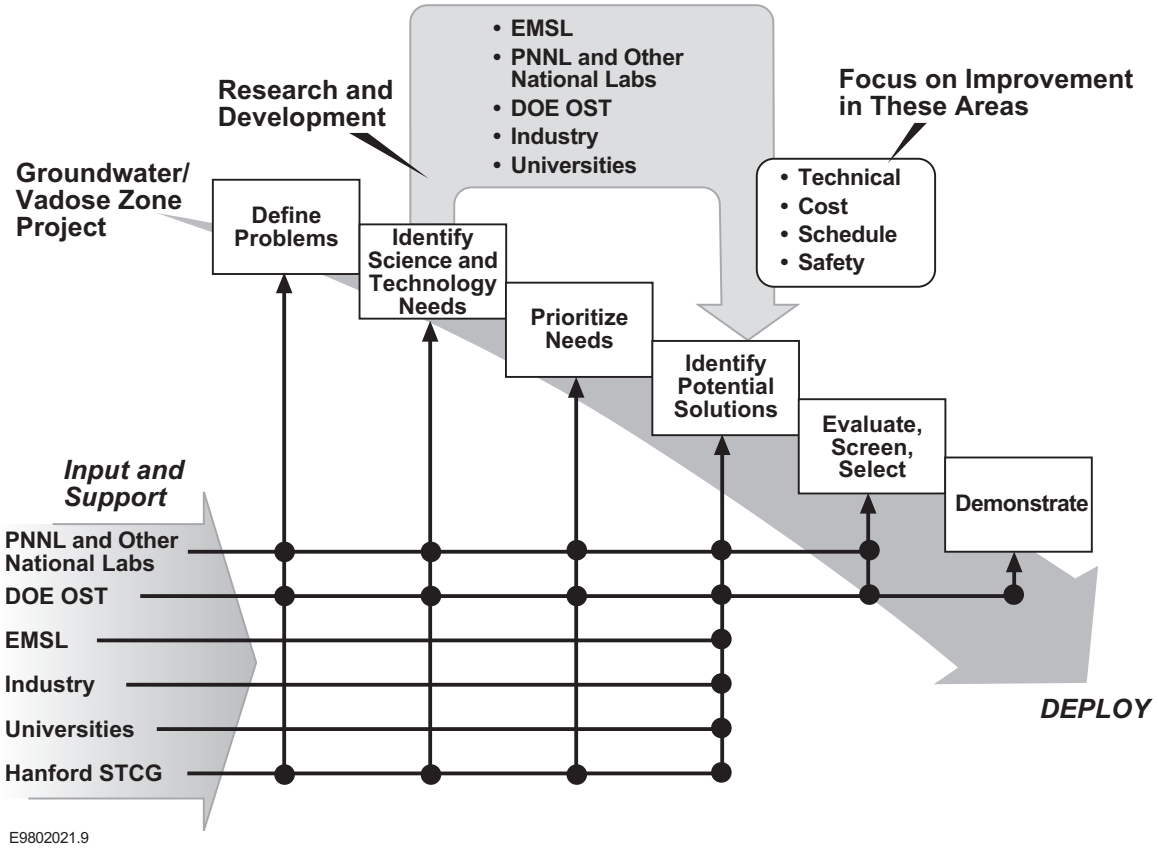
The characteristics of the Hanford Site GW/VZ, combined with the type and distribution of contamination, create significant technical challenges for cleanup efforts. The main challenges include needs and opportunities for improvement in both technology and science, particularly in the areas of characterization, modeling, remediation, and monitoring. These areas will be addressed through a focused and integrated process that meets cleanup performance requirements, and which aggressively seeks to improve cost, schedule, and safety.

The GW/VZ Project will develop a science and technology approach that supports cleanup decisions and actions resulting in the protection of groundwater and the Columbia River. The approach will be based on technology roadmapping principles. Road maps are tools used to

make science and technology (S&T) investment decisions that ensure S&T investments are focused on critical path problems, and will deliver solutions according to established schedules. The Hanford Site's proposed GW/VZ S&T roadmapping approach is described in Appendix D.

The overall process for infusing science and new technology is shown in Figure 3-4. Planning and implementation activities will include the participation of the DOE Office of Science and Technology (OST), the Hanford Site Technology Coordination Group (STCG), PNNL and other national laboratories, the Environmental Molecular Sciences Laboratory (EMSL), private industry, universities, and the BHI Technology Application group. Science and technology application will be integrated in the technical baseline and identified as needs in the LRP.

Figure 3-4. The GW/VZ Needs-Driven Science and Technology Process.



3.5.1 Prioritize Needs

Through the S&T roadmap process, problems will be defined and science and technology needs will be identified to address both near-term and long-term challenges. Technical, cost, schedule, and safety requirements will be identified for specific unique problems and broad integration issues. Needs will be linked to the integrated baseline and LRP, and will be assigned priority

research, and will be planned and scheduled accordingly. The OST, STCG, PNNL and other national labs will participate to ensure a thorough understanding and effective communication of needs and priorities.

Figure 3-5 lists several key current vadose zone needs that have been broadly communicated to potential science and technology providers. The full listing of needs is available on the Internet from the Richland ER Project Improved Technology Opportunities web page.

3.5.2 Technology Application

An integrated approach will be implemented to identify improved technologies. The project team, in conjunction with PNNL, will lead the effort to evaluate, screen, and select technologies for demonstration and deployment. Potential technologies are currently being sought through the efforts of OST, STCG, PNNL, and industry, and this effort will be broadened to include other national laboratories and universities.

3.5.3 Research and Development

Research and development will be employed where technology does not exist to meet a need, or where a solution is prohibitively costly. BHI has established an active partnership with EMSL to respond to science needs for the ER Project. A focused effort will be implemented to meet the GW/VZ science needs, and will be broadened to include participation from national laboratories, industry, and universities.

3.6 TECHNICAL REVIEW PROCESS AND PANELS

Three peer review processes will be used to ensure that GW/VZ Project work meets established objectives with the highest levels of scientific, technical, and engineering excellence. These processes include the following:

- National laboratory participation in planning and implementation
- Technical expert panels
- Independent external peer reviews by the National Academy of Sciences (NAS).

The three types of peer reviews address varying project needs in terms of near-term vs. long-term problems, the appropriate degree of technical focus, and the level of independence for recommendations. The function and role of each of these peer review categories is described below.

3.6.1 National Laboratory Participation in Planning and Implementation

PNNL will be responsible for leading and coordinating the participation of other national laboratories in the GW/VZ Project. This effort will be focused on developing an integrated applied science and technology effort in support of user-identified needs that derive from cleanup decisions and actions that affect the vadose zone, groundwater, and Columbia River

Figure 3-5. Science and Technology Needs.

Category	Science Needs	Technology Needs
Characterization	• Chemical speciation and complexation in site-specific groundwater • Chemical binding on site-specific mineral surfaces • Chemical form and mobility of dense, non-aqueous phase liquids in Hanford subsurface	• Real-time, in situ detection of carbon tetrachloride, Cr^{+6} and Sr-90 in groundwater • In situ characterization of extent of Cr^{+6}, Hg, and Pb in soils • In situ characterization of extent of radionuclides: U, Pu, Cs, Co, and Sr-90 in soils
Modeling	• Cs migration beneath tanks • Reaction rates for key contaminant species and complexes in groundwater • Rates of coupled abiotic and biogeochemical reactions involving subsurface contaminants in Hanford • Rates of colloid formation and colloidal transport of contaminants in groundwater • Effect of subsurface heterogeneities on chemical reaction and transport	• Contaminant mobility • Data and tools for performance assessments
Monitoring	• Use of chemical surrogates for contaminants • Chemical indicators of remedial technology processes • Chemical sensor principles	• Real-time, in-line detection of carbon tetrachloride, Cr^{+6} and Sr-90 in groundwater
Remediation	• Mathematical formulations of chemical reaction/material transport • Reactivity of organics in Hanford subsurface • Interaction of remedial processes with Hanford subsurface • Selectivity for contaminants in Hanford subsurface	• Long-life waste isolation barrier • In situ remediation of carbon tetrachloride in the vadose zone and groundwater • Real-time, in-line detection of carbon tetrachloride, Cr^{+6} and Sr-90 in process water • In situ remediation of Cr^{+6} and Sr-90 in groundwater • In situ remediation in the vadose zone of Cr^{+6}, Hg, Pb • In situ remediation in the vadose zone of radionuclides: U, Pu, Cs, Co, and Sr-90 • Real-time field screening during excavation of Cr^{+6}, Hg, Pb • Real-time field screening during excavation of radionuclides: U, Pu, Cs, Co, and Sr-90

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resources. This effort will result in broad participation of scientists with relevant experience from other national laboratories, including (for example) Los Alamos National Laboratory, Lawrence Livermore National Laboratory, and Lawrence Berkeley National Laboratory.

The national laboratory effort will be: 1) driven by project needs and schedules; 2) focus on providing solutions; and 3) identify the interfaces between Hanford Site users and the basic and applied research and development community. Initial objectives of this effort will be to: 1) establish clear mechanisms for linking science and technology to decisions and actions; 2) establish clear mechanisms for linking the basic research community to Hanford Site needs; and 3) support prioritization of identified science and technology requirements. In seeking solutions for identified problems, the applied science and technology effort will also canvas other sources including academia and the private sector. Several workshop are planned to frame the scientific and technical issues that need to be addressed.

3.6.2 Technical Expert Panels

Panels of technical experts will be used by the GW/VZ Project to address specific technical issues. The panels will focus on problem resolution and technical reviews. The purpose of the external panels is to provide RL with technical observations and recommendations regarding the planning, execution, and interpretation of results from the GW/VZ Project. In this way the panels may function in a review or consulting mode, depending upon the specific need being addressed, and the panels will thereby ensure appropriate technical reviews of project activities and deliverables. The SX Expert Panel and the TWRS vadose zone interagency team are recent examples of how such technical reviews are used to examine and contribute to the resolution of complex project issues. Areas of greatest importance for the reviews include, but are not limited to, areas that have: 1) a high degree of technical uncertainty; 2) significant impacts on project outcomes; and 3) unresolved issues resulting from differences in technical interpretation. Fifteen technical discipline areas have been identified to date that will require to support the GW/VZ Project. These are as follows:

- Radiochemistry
- Nuclear downhole logging
- Geohydrology
- Hydrologic modeling
- Vadose zone flow and transport field studies
- Vadose zone flow and transport modeling
- Geochemistry
- Groundwater flow and transport
- Geology (sedimentology and sedimentary structures)
- Risk analysis/dose assessment
- Surface geophysics
- Geophysical logging
- Regulatory processes
- Operations research/decision analysis.

In order to accommodate the breadth of reviews needed, a pool of potential expert participants will be identified based on education, relevant experience, peer recognition and contributions to the profession associated with their expertise. The panel will report to RL. The Field Office Manager will select the best qualified available experts for a particular panel. The SX Tank-Farm Expert Panel is expected to continue to address critical issues related to groundwater contamination from tank leaks. This effort will be expanded (as needed) to accommodate the required additional expertise.

Expert panels will be convened according to project needs, and will operate under written procedures that address requirements, protocols, timeliness of producing panel reports (three weeks following end of the review meeting), and a formal recommendation and comment resolution tracking and response process.

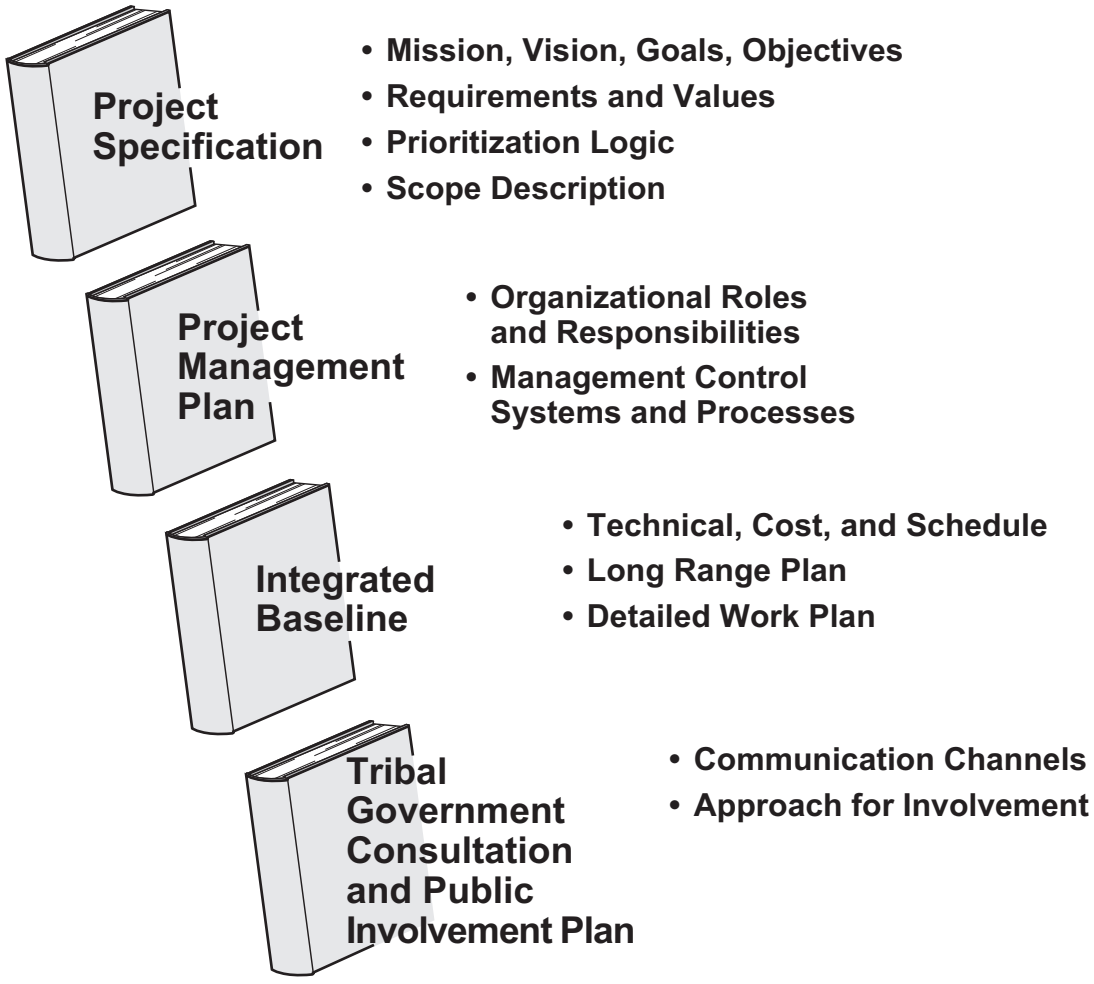
3.6.3 Independent External Peer Review by the National Academy of Sciences

RL will request independent, external peer reviews on a periodic basis that will be conducted by the NAS. These reviews will be conducted to avoid conflicts of interest or any bias potentially associated with conclusions and recommendations. In accordance with NAS standards, this review will consist of highly qualified technical experts. Reviews will focus on overall project strategy, technical viability, and execution. A NAS workshop is planned for October 1998 to initiate this effort.

4.0 DEVELOPMENT OF REQUIRED BASELINE DOCUMENTS

As stated in previous sections of this document, the site-wide GW/VZ integration effort will be managed as a project, based on the approach used by the AME and BHI to manage the Richland ER Project. A set of project baseline documents will be developed to support GW/VZ planning and management activities, in order to be consistent with RL's requirements for all projects. These documents are listed in Figure 4-1.

Figure 4-1. GW/VZ Project Document Hierachy.



The GW/VZ Project team will prepare the plans and supporting baseline components during Phase II of the integration effort (see Section 1.0, Figure 1-1). It is anticipated that all baseline documents will be issued by September 30, 1998, following a thorough internal and external review and comment cycle. A summary schedule of the overall document development effort is provided in Section 5.0 (see Figure 5-1).

A description of the scope, objectives, content, and the assumptions and constraints for preparation of each of these project baseline documents is provided in the following paragraphs and supporting appendices.

The primary drivers for the project baseline documents are as follows:

Letter, Linda K. Bauer (DOE-RL) to Mr. S. D. Liedle (Bechtel Hanford, Inc.) subject contract DE-AC06-93RL12367 - *Site-wide Groundwater/Vadose Zone Integration*, dated December 3, 1997.

Hanford Federal Facility Agreement and Consent Order (*Tri-Party Agreement*), Fifth and Sixth Amendment, dated February 1996.

Hanford Site Strategic Plan; site priorities, and programmatic direction established by RL and HQ.

Community Relations Plan for the Hanford Federal Facility Agreement and Consent Order, dated February 1997.

Part II: *Requirements for the Columbia River Comprehensive Integrated Assessment* (DOE/RL-96-16 DRAFT).

NOTE: For clarification, it should be noted that the AME letter of direction to BHI specifically requested that revisions be made to the current DOE/RL-89-12, *Groundwater Protection Management Plan* (GPMP). In its development of the management approach for this integration effort, the project team recognized several overlaps and gaps between the published guidelines for preparing a GPMP and the ER Project and Hanford Site standards for project baseline documents.

The AME and BHI have agreed that the new GW/VZ Project documents should follow the ER and Hanford Site hierarchy of documents; this is the approach described in this section. However, the basic content elements and intent of the GPMP guidance will be incorporated into the project's plans and supporting documentation. Appendix A, Attachment A, presents a summary "crosswalk" table to indicate where GPMP requirements will be satisfied in the planned GW/VZ documents.

4.1 PLAN FOR PREPARATION OF THE GW/VZ PROJECT SPECIFICATION

4.1.1 Scope Description

The *Project Specification* is a strategic level document that defines and describes the technical scope of the GW/VZ Project. The *Project Specification* will identify site activities affecting subsurface contamination and transport, as well as protection of Hanford Site groundwater resources and the Columbia River. Sources of information that will be used in defining the project scope include published reports and studies, issues and recommendations, interviews

(internal and external to the Hanford Site), existing technical baselines, physical boundaries of the soil and groundwater system, and current strategies and decision documents.

4.1.2 Plan Objective

The *Project Specification* will define the boundaries of the technical scope and the goals of the GW/VZ Project in sufficient detail to allow subordinate documents (the *Project Management Plan*, integrated baseline, *Tribal Government Consultation and Public Involvement Plan*) to be developed. These documents will outline the specific means of GW/VZ Project implementation. Elements that will be addressed in this document include the following:

- Statements on the mission and vision for the project.
- Background information that provides an understanding of the project basis and direction.
- A statement of project objectives that incorporates priorities and values.
- A listing of quantifiable goals for key project activities.

The specification will clearly state that a disciplined systems engineering approach will be applied, and a prioritization logic will be developed, to implement the strategic goals identified in the project specification.

4.1.3 Plan Content

An annotated outline for the *Project Specification* is provided in Appendix A.

4.1.4 Plan Assumptions and Constraints

A key assumption for the integration of GW/VZ activities is that the technical requirements of the GPMP, as defined in DOE Order 5400.1, provide a sufficient baseline for defining all the necessary elements of the GW/VZ Project. The *Project Specification* addresses strategic requirements of the GPMP.

In order for the *Project Specification* to provide a credible and strategic approach to integrating GW/VZ activities to protect water resources, RL must establish specific and quantifiable goals for key project activities. The expected future conditions for the Hanford Site should be defined through interim and final records of decision (RODs) in order to provide a meaningful context for these goals.

4.2 PLAN FOR PREPARATION OF THE GW/VZ PROJECT MANAGEMENT PLAN

4.2.1 Scope Description

The PMP encompasses overall management of the defined technical scope, cost, and schedule baselines for the GW/VZ Project, including all associated planning, work execution, and baseline changes.

The plan defines the authorities, organizational roles, and responsibilities of participants in this management and integration effort, as well as the application of control systems for directing work and reporting progress. The PMP emphasizes a disciplined systems engineering approach for correlating systems, activities, and organizational entities that are associated with the project mission.

The PMP will incorporate existing systems and processes to the fullest practical extent. A graded approach will be used in applying requirements relative to the complexity and budgeted value of the elements that are managed within the GW/VZ Project.

4.2.2 Plan Objective

The development of effective project management tools is a necessary early step to establish integrated oversight and control of the Hanford Site's many interrelated GW/VZ activities. Preparing and implementing results-oriented project plans, systems, and associated processes will also serve to establish credibility with Tribal Nations, stakeholders, and regulators.

The primary objectives of the PMP are to outline and facilitate those management processes and actions necessary to accomplish the following:

- Definition of the GW/VZ Project scope and responsibilities, with established baselines and planning methods for the project.

- Identification of processes to monitor GW/VZ Project status, report and analyze performance indicators, and provide adequate visibility for identified project risks.

- Ensuring adequate control and configuration management of changes to project baselines, including technical configuration control and performance measurement baselines.

The PMP will identify the GW/VZ Project participants, including main responsibilities, the role each participant performs in relation to the project, and primary interfaces between entities. The plan will provide for and emphasize the importance of cooperative relationships between RL, incumbent contractors, Tribal Nations, stakeholders, and regulators. Effective interactions will help ensure the achievement of the following results:

- Understanding of and commitment to goals and objectives among the participants
- Continuous awareness of project status
- Early identification of impending problems
- Timely resolution of issues
- Increased efficiency for involved programs and organizations
- Improved coordination and communication.

The PMP will establish a logical systems engineering approach to achieve coordinated site-wide planning, integration of resource requirements, improved site-wide "what if" analyses, prioritization of cross-program activities, life-cycle cost improvements, and identification of focused technical needs. The plan will define (at a summary level) the structure of the project's technical and administrative work elements, so as to illustrate the integration of involved programs and organizations. The PMP will ensure that all known requirements affecting the project are identified and considered in developing technical, cost, and schedule baselines. Critical path activities and major milestones will be incorporated into these baselines.

The PMP will summarize the project's account structure for collecting costs against specific scopes of work. It will stipulate the following:

- Budgets must be established at the proper levels, and must be time-phased to the project schedule.

- Costs will be identified and effectively managed.

- After GW/VZ work is defined, organized, and planned, the resulting control account must be authorized by the appropriate level of management before tasks are executed.

The importance of accurate and timely cost estimating, cost accounting, budget trending, estimates-at-completion, and financial change control will be emphasized as integral aspects of baseline management. Effective cost variance analysis thresholds will be established in the PMP.

Meaningful performance indicators will be established to gauge progress and provide early warnings of project problems. Project status will be determined by analyzing technical, schedule, and cost performance factors against approved baselines, and through analysis of potential problems, their impacts, and alternative courses of action.

Another objective of the PMP is to provide contractor and RL management with timely, accurate, and useful information to manage the GW/VZ Project and to communicate GW/VZ information to senior RL management, Tribal Nations, stakeholders, regulators, and other interested public entities. The GW/VZ Project organization will establish requirements to ensure that progress reports are prepared in formats (at appropriate levels of detail) to facilitate analysis, evaluation, and corrective action.

An overriding objective of the PMP is to ensure consistent application of approved management policies and systems throughout the life of the GW/VZ Project. This is particularly important to the GW/VZ management and integration mission, because of the number (and diversity) of involved programs, participating organizations, and interested parties.

4.2.3 Plan Content

An annotated outline for the PMP is provided in Appendix B.

4.2.4 Plan Assumptions and Constraints

For the purposes of preparing the PMP, it is assumed that the RL/AME organization is responsible for overseeing the GW/VZ management and integration mission, and that BHI will be the performing prime contractor.

Other assumptions guiding the preparation of this document include the following:

- The site-wide integration function will be managed like a project. The design of the management structure, organizational roles, the baseline framework, and baseline tools will be based on the Hanford Site's ER Project approach.

- Sufficient enabling authority will be assigned to the GW/VZ Project team to accomplish the site-wide integration of multiple programs' plans and activities.

- Site contractors will continue performing current year DWP-authorized and funded activities, unless specific activities conflict with the purposes and mission of the site-wide GW/VZ integration effort. Future year activities of involved programs will be reviewed and coordinated with the integration organization to ensure comprehensive overall planning information, as well as compatibility with this site-wide mission.

- Effective Memoranda of Understanding (MOUs) and Memoranda of Agreement (MOAs) will be agreed to by involved RL entities and Hanford Site prime contractors (and subcontractors, as applicable) to formally document necessary interactions and cooperative relations.

- Since the project's intent is to integrate currently assigned RL and contractor responsibilities, rather than create new ones, it is anticipated that any contract modifications will be minimal.

In terms of potential constraints, the effectiveness of the GW/VZ management and integration effort will have a direct correlation to the actual authority given to the AME, as the lead RL project office, and to BHI, as the integrating contractor. The authority must be sufficient to achieve collaboration with other Hanford Site projects and contractors, to establish configuration control of the technical baseline, influence work priorities, monitor and effect control over baseline performance, manage budget and ER-authorized funds, and manage change control.

For specific support tasks procured through site services work orders or subcontracts, BHI's authority must be sufficient to direct contractor costs, schedules, and technical performance.

4.3 PLAN FOR PREPARATION OF THE GW/VZ INTEGRATED PROJECT BASELINE

4.3.1 Scope Description

The project baseline identifies the processes, tools, and resources required to develop and maintain the GW/VZ Project cost, schedule, and technical scope of work. The identified deliverables include the prioritization logic, the LRP, the baseline estimate database, baseline schedule shells, and the framework for the DWP.

4.3.2 Objective

The objective of this section is to define the content, format, and process for the preparation and maintenance of a GW/VZ Project baseline.

The primary objective of this baseline development effort is to identify the actions necessary to define the GW/VZ Project scope, cost, and schedule, and to assign responsibility for these elements. Because baseline management involves those actions required to ensure adequate project control and maintenance, the baseline provides the benchmark for evaluations of project performance.

The GW/VZ baseline will evolve from initial definition of technical requirements, cost estimates, and schedule milestones through development of detailed plans. In addition, the baseline is influenced by regulatory constraints, funding guidance, general changes in conditions, and revisions from RL direction. These changes will be incorporated into the baseline through standard change control processes.

4.3.3 Content

This baseline includes the development process and the following deliverables:

- Prioritization logic
- Cost baseline
- Schedule baseline and LRP framework
- DWP framework.

These deliverables will be based on processes, formats, and procedures that have been established within the ER Project. The GW/VZ Project will utilize the existing Hanford Site WBS. The GW/VZ Project baseline will be unique in that the activities identified in the baseline will fall under the technical baseline management of the GW/VZ Project, while implementation, budget requests (Program Baseline Summary [PBSs]), performance tracking (cost and schedule variances) and reporting (Progress Tracking System [PTS]) will be managed by the projects

responsible for GW/VZ activities. Additionally, the GW/VZ Project will roll up the baseline activities for monthly status and performance reporting purposes.

The first step in the planning process is to define the existing work scope and associated interfaces. This effort will be performed to support the *Project Specification*, PMP, and the integrated baseline. Once the existing work scope and interfaces are defined the overall baseline task can be initiated. The planning process flow chart (see Figure 3-3) identifies the overall GW/VZ Project planning process.

The prioritization logic will initially be based on PHMC, PNNL, and ER Project priorities for existing work scopes. As goals and near term success criteria are developed for the GW/VZ Project, the prioritization logic will be revised.

The cost baseline framework will provide a database that will contain the existing GW/VZ work scope cost estimates. The current work scope will not be re-estimated during this initial planning effort. Any new work scope (including overall management and integration costs) will be estimated and included in the database. The cost baseline will be maintained at the cost account level, and will include "To Date" costs for FY 1998 and "To Go" costs. The costs prior to FY 1998 will remain in their current accounts. Each cost account level activity will include estimates of labor, equipment and materials, and subcontracts.

The schedule baseline will provide a schedule at the cost account level. Detailed schedules below the cost account will be prepared and maintained in the DWP. The scheduling of activities will be based on the GW/VZ prioritization logic and funding levels.

A LRP will be developed that includes ongoing activities, any newly identified activities, critical interfaces, milestones, and existing commitments. The LRP will be used as a communication tool to depict lifecycle scope, schedule, and costs.

In order to support the FY 1999 planning cycle, guidance for the GW/VZ Project DWP will also be provided. The GW/VZ DWP will cover the three year window of FY 1999-FY 2001. The guidance will reflect processes and guidance for the ER Project, but will also be tailored to support the first GW/VZ DWP effort. Unique differences for the initial GW/VZ DWP guidance will include the following:

- Initial goals and objectives based primarily on existing project/program prioritization and current Hanford Site strategies.

- Funding guidance that begins with the guidance established within existing projects/programs for the scope identified for the GW/VZ Project.

- Resolution of any conflicts in priorities identified by the GW/VZ Project within current project programs, budgeting, and work planning processes.

- An initial DWP effort for the GW/VZ Project that will not have the benefit of following a mature, developed LRP that is supported by detailed, integrated, and consistent cost estimates.

A DWP process for the GW/VZ Project will be initiated in 1998, with updates in subsequent years, following the established ER planning cycle and format.

This initial GW/VZ DWP (in FY 1998) will consist of detailed plans for currently identified scope, including the ER Project and other Hanford Site projects, as well as new activities that will be planned to support the GW/VZ management and integration efforts. Subsequent DWP cycles will incorporate the revised estimates and logic for existing and new scope (as appropriate). The DWP update process is cyclic, and will incorporate revised information as it is developed in each fiscal year.

The GW/VZ DWP process will parallel the ER DWP process. The prioritization logic supporting the GW/VZ Project must also be reflected in the ER logic and the overall Hanford Site *Integrated Priority Logic*.

4.3.4 Plan Assumptions and Constraints

The following assumptions and constraints are pertinent and applicable to the integrated baseline deliverables for the GW/VZ Project:

- The integrated baseline work scope will include the GW/VZ activities that are currently ongoing at the Hanford Site, as well as new management and integration activities.

- The basis for the integrated baseline processes, tools, products, and procedures derives from the ER Project.

- Reporting (through PTS) and budgeting (through PBS) will be managed through the project that is currently responsible for implementation of the work scope.

- Definition of GW/VZ Project goals and success criteria is necessary in order to develop a meaningful prioritization logic.

- The work scope definition, prioritization logic, and WBS/Organizational Breakdown Structure (OBS) are required to complete the initial baseline activities.

- GW/VZ Project reviews will be held on a monthly basis, and will include the PHMC, PNNL, and BHI.

4.4 PLAN FOR PREPARATION OF THE GW/VZ TRIBAL GOVERNMENT CONSULTATION AND PUBLIC INVOLVEMENT PLAN

4.4.1 Scope Description

A *Tribal Government Consultation and Public Involvement Plan* will be developed to encourage input concerning effective methods of public involvement and communication issues associated with integrating GW/VZ operational activities. The plan will serve as a starting point in the development of an interactive approach for the Tri-Party Agencies to seek the involvement, values, and advice of Tribal Nations and stakeholders for consideration in major GW/VZ Project documents.

4.4.2 Plan Objective

The *Tribal Government Consultation and Public Involvement Plan* will accomplish the following objectives:

- Demonstrate that RL is taking action to determine how best to integrate and manage diverse GW/VZ characterizing, monitoring, and remediation operations.

- Involve the Tribal Nations and other stakeholders in defining possible roles and expectations during the GW/VZ integration process.

- Ensure Tribal Nations and stakeholder inputs are communicated to RL and those contractors that are included in development of the integrated GW/VZ activities.

- Maintain ongoing communications with the Tribal Nations and stakeholders during the integrated GW/VZ process.

- Ensure that GW/VZ information is accurate, clear, timely, consistent, and understandable to all direct and potential audiences.

- Involve RL and contractor senior management in outreach and involvement activities.

4.4.3 Plan Content

- An annotated outline for this plan is provided in Appendix C.

4.4.4 Plan Assumptions and Constraints

- GW/VZ Tribal Government consultations and public involvement activities will be performed in conjunction with the RL-Office of External Affairs Manager, the RL-Indian Nations Program Manager, and the RL-Public Involvement Manager.

- Tribal Nation consultation and public involvement interactions will be developed and coordinated with existing processes and will be evaluated within GW/VZ Project resources.

5.0 GW/VZ INTEGRATION SUMMARY SCHEDULE

The summary schedule shown in Figure 5-1 depicts the GW/VZ Project milestones, key deliverables, and activities for Phase II (Integration and Formulation) and Phase III (Full Implementation).

The schedule is organized into six work categories:

1. Pre-Planning
2. *Project Specification*
3. *Project Management Plan*
4. Cost & Schedule Baseline and LRP
5. *Tribal Government Consultation and Public Involvement Plan*
6. Project Management and Integration

Groundwater/Vadose Zone Integration - Summary Schedule

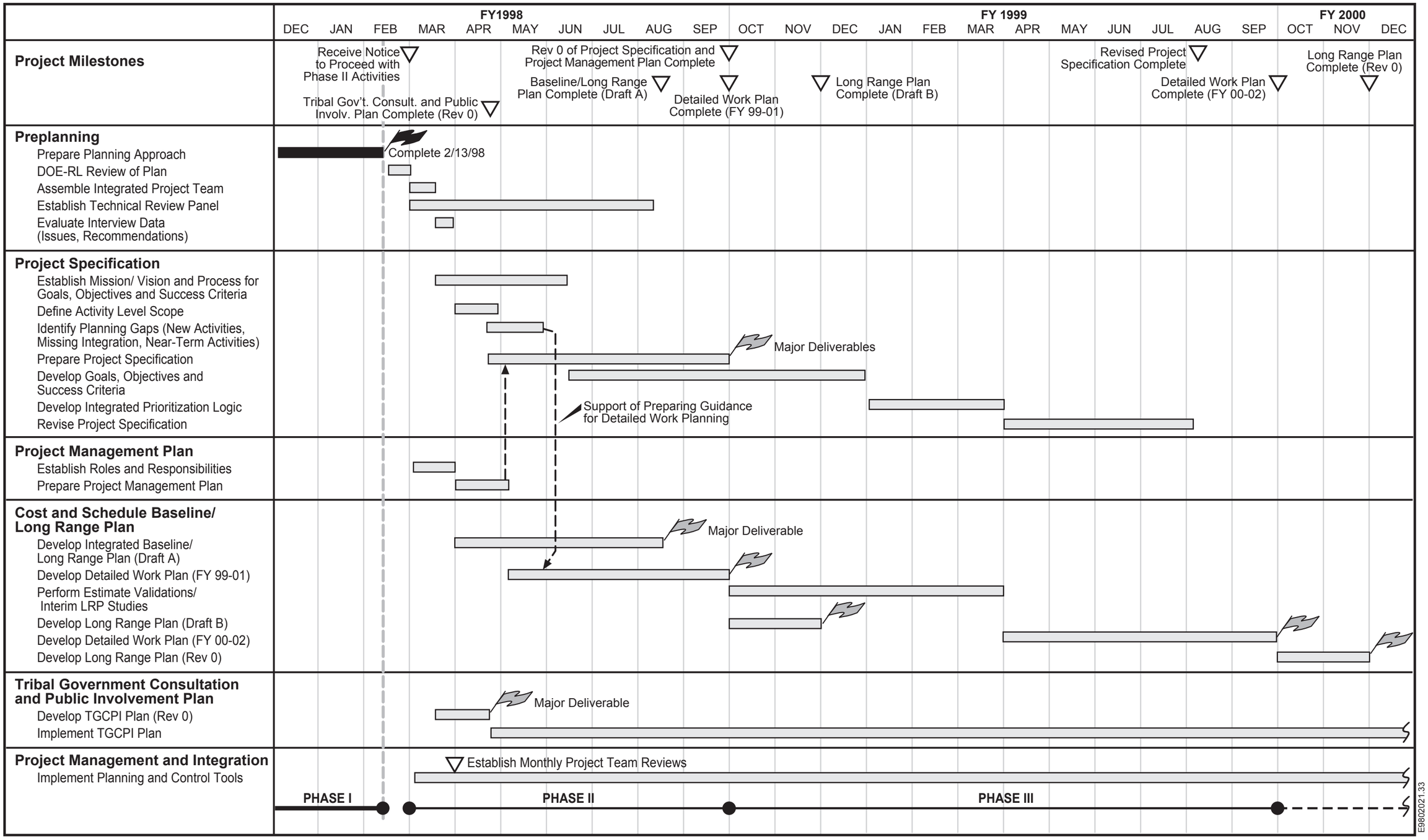


Figure 5-1. GW/VZ Summary Schedule.

APPENDIX A

GW/VZ PROJECT SPECIFICATION ANNOTATED OUTLINE

APPENDIX A

GW/VZ Project Specification Annotated Outline

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

The primary purpose of the project specification is to define the boundaries and key work scope elements that are necessary to protect Hanford Site groundwater resources and the Columbia River. Key elements include resource utilization, pollution prevention, geohydrologic and geochemical investigations, groundwater flow and contaminant transport predictions, environmental cleanup and confirmation monitoring. The project specification also fulfills the need for a GPMP, as required by DOE Order 5400.1. Appendix A (of the P*roject Specification*) provides a proposed crosswalk between the requirements of a GPMP and the project documents that will address specific requirements. Groundwater resources include all water on the site (for example, surface water recharging the vadose and groundwater, unsaturated soil moisture, perched water, etc.).

1.2 BACKGROUND

This section of the specification summarizes the basis for the GW/VZ Project. The discussion will include the need for a systematic site-wide approach for managing and integrating the GW/VZ Project. This section must provide a summary discussion of the direction provided by RL for BHI to establish and lead the GW/VZ Project.

1.3 DOCUMENT HIERARCHY

This section will define the relationship among key project documents and other key site documents. Illustrations will show how key project documents are incorporated into the overall hierarchy of Hanford Site documents.

2.0 MISSION, VISION, GOALS, OBJECTIVES, AND SUCCESS CRITERIA

This section will incorporate the mission, vision, goals, objectives, and success criteria of the GW/VZ Project. It will show how key elements of the project should be developed through facilitated meetings with key project team members, using input from Tribal Nations, stakeholders, and regulators.

2.1 MISSION AND VISION

This section establishes the mission and vision statements for the GW/VZ Project.

2.2 GOALS

This section will identify quantifiable goals needed to protect water resources at the Hanford Site. These goals must meet the requirements of decision documents (e.g., *Tri-Party Agreement*, RODs and Permits). The goals will also incorporate Tribal Nation and stakeholder values, while factoring in regulatory and programmatic requirements. These goals will be grouped by key project activities.

2.2.1 General

This section identifies broad goals that cross-cut over several key areas of the GW/VZ Project.

2.2.2 Waste Minimization

This section will state the goals for minimizing wastes released to the environment, with emphasis on those wastes that have the potential to impact water resources on the Hanford Site. This section should incorporate existing programs and As Low As Reasonably Achieveable (ALARA) principles.

2.2.3 Pollution Prevention

This section will state the goals for preventing the pollution of water resources at the Hanford Site. This section will incorporate information from existing programs as well as ALARA principles.

2.2.4 Geohydrologic System Definition

This section will state the goals for defining the physical aspects of the Hanford Site surface water, groundwater, and vadose flow systems.

2.2.5 Contaminant Fate and Transport Definition

This section will state the goals for identifying chemical contaminants, and defining the chemical interactions and movement of contaminants in the surface water, groundwater, and vadose flow systems.

2.2.6 Performance Allocation

This section will establish interim goals for disposal actions that protect water resources. Final goals will be established as a basis for evaluating decisions that potentially impact groundwater resources at the Hanford Site.

2.2.7 Assessment

This section will state the goals that establish the quality of individual assessments (e.g., risk, performance, etc.) and coordination between confirmation activities and assessments.

2.2.8 Remediation

This section will state the goals for demonstrating that remedial actions will protect water resources on the Hanford Site. Specific cleanup goals will be defined.

2.2.9 Confirmation Activities

This section will state the goals for demonstrating that confirmation (monitoring) activities will protect water resources on the Hanford Site. The goals for confirmation activity require the project to establish physical points for measurement of confirmation (e.g., Future Site Uses Working Group boundaries of the 200 Areas), in terms of the concentrations that must be achieved.

2.3 OBJECTIVES

This section will describe the GW/VZ objectives that incorporate the values, goals, and priorities established for the protection of Hanford Site water resources.

2.4. SUCCESS CRITERIA

This section will state the criteria for key project elements that will demonstrate how project activities are protective of Hanford Site groundwater resources, as well as the Columbia River.

3.0 REQUIREMENTS, VALUES, AND RECOMMENDATIONS

3.1 REQUIREMENTS

This section identifies federal, state, and local laws and regulations; DOE orders; *Tri-Party Agreement* milestones; requirements for site operating systems; and public values.

3.2 VALUES

This section provides a summary of the Tribal Nation, stakeholder, and public values. The primary sources for these values will derive from recent interviews conducted as part of planning for the GW/VZ Project, and the comments received on this plan from Tribal Nations, stakeholders, and the public.

3.3 RECOMMENDATIONS

This section provides a summary of the issues and recommendations developed from external organizations that reviewed GW/VZ activities or documents. External organizations include the National Academy of Sciences and expert technical peer review panels.

4.0 SITE CONDITIONS

4.1 EXISTING CONDITIONS

This section provides a brief overview of surface and subsurface conditions, and existing facilities and infrastructure. The section will include illustrations of the sources of contamination, the types of contamination, and their movement. Additional detail available in other documents will be referenced in this section.

4.2 FUTURE CONDITIONS

This section provides a brief overview of expected Hanford Site conditions. Key sources of the information will be identified in the LRP and the Future Site Uses Working Group (FSUWG) land use recommendations (until final land uses are determined).

5.0 PRIORITIZATION LOGIC

The prioritization of the GW/VZ Project activities is based on overall Hanford Site prioritization criteria and project-specific prioritization logic.

The criteria used to develop the Hanford Site integrated priorities considered risk, legal requirements, the views of Tribal Nations, stakeholders, regulators, and trustees, along with management judgment. Work scope elements are prioritized and risk evaluations are examined to ensure high priority work is also resulting in appropriate levels of risk reduction at the Hanford Site.

The overall Hanford Site prioritization criteria include minimum safe operations, mitigation of urgent risks, essential services, compliance issues, and reduction/ elimination of costly mortgages.

Within the framework of the Hanford Site criteria the GW/VZ Project will develop its own prioritization logic. This logic will be based on the goals and success criteria that are developed in the initial phase of the project. As the goals and success criteria are refined the GW/VZ priorities will be revised. It is this logic that will drive the sequencing of GW/VZ activities in the LRP schedule.

6.0 VADOSE/GROUNDWATER PROJECT ACTIVITIES

This section describes the technical scope of the GW/VZ Project at the activity level. As such, this section expands on the summary level scope discussed in Section 1.1 of this project specification outline. Eight categories cover the scope of the entire program. Under each category a brief discussion is provided for those elements that comprise a successful program. Details will be added as the plan is developed.

6.1 WASTE MINIMIZATION

Effective waste minimization requires current waste projections, product and process evaluation, identification and replacement of hazardous materials with less environmentally sensitive materials, inventory control, and significant tracking and management of wastes by the generators.

6.2 POLLUTION PREVENTION

The prevention of contamination is always preferable over remediation. Prevention should include material purchase control, control of waste generation, storage, treatment, disposal, permitting (and monitoring) of discharges, elimination (or reduction) of discharges.

6.3 GEOHYDROLOGIC SYSTEM DEFINITION

Water resource protection requires a basic understanding of the system that accumulates, changes, transports, and eventually releases contaminants to the public and the environment. Activities under this category should include hydrologic investigations, geologic investigations, meteorological studies, geophysics investigations, river-groundwater investigations, and flow modeling.

6.4 CONTAMINANT FATE AND TRANSPORT DEFINITION

The understanding of contaminants released into the environment, as well as their transport and change, is essential to any water resource protection program. Activities that should be included are studies of contaminant release mechanisms, soil-water interactions, contaminant mobilization and retardation mechanism, and biochemical changes.

6.5 PERFORMANCE ALLOCATION

The performance allocation process defines the elements of an engineered-geologic system that are relied upon to provide a selected level of protection. Allocations are often qualitative but sometimes quantitative. Recognition of the important elements of a protective system allows informed judgments to be made on how well elements must be understood.

6.6 ASSESSMENT

Assessments of the highest quality of water resource problems are essential to a water resources protection project. These assessments should be technically strong and complete; they should maintain similar approaches, use common data sources, maintain similar assumptions, use similar land use assumptions and common risk assessment paradigms. Risk and performance assessments are two types of assessments commonly required by RL to protect human health and the environment.

6.7 REMEDIATION

Remediation is divided into two sections, due to the generally different time frames and approaches taken to remediate contamination.

- *Groundwater*

  A strong groundwater remediation program should recognize regulatory constraints, prioritize problems, evaluate remediation alternatives and aggressively implement selected remedies. Each remedy should be continuously evaluated (i.e., performance monitoring) and either continued, improved, or stopped. A monitoring network evaluating a system's effectiveness in meeting its intended purpose is essential.

- *Vadose Zone*

  A vadose program should concentrate on controlling natural and artificial driving forces. These forces include leaks, recharge and runoff from rainfall, and water main breaks. Emphasis should be placed in methods to detect and measure the generally slow movement of contaminants at low-moisture conditions in this medium.

6.8 CONFIRMATION ACTIVITIES

Confirmation activities include all types of monitoring needed to (1) measure changes in the groundwater and vadose systems; (2) evaluate the effectiveness of remedial actions; and (3) confirm predictions of groundwater and vadose zone flow and transport conditions. These activities should include data management, quality control, and continual activity to improve sampling and analysis methods, automated data reduction programs, and a continued emphasis on professional data evaluation.

7.0 PROJECT MANAGEMENT

This section summarizes key information derived from the PMP. The section will include an overview of the GW/VZ roles and responsibilities, interfaces (physical system, organizational, and programmatic), integration management and control processes, database management, and communications. Figures will be used in this section to demonstrate key elements. Key

activities are categorized as either (1) central (core) to the management/integration scope; or (2) involving interfaces that require support from other Hanford Site projects.

8.0 INTEGRATED BASELINE

The information presented in this section will summarize information found in the *Integrated Baseline*.

ATTACHMENTS

Attachment A: Crosswalk of GPMP requirements to the integrated project documents (a draft crosswalk is attached).

Attachment B: Applicable federal, state, and local laws and regulations.

Attachment C: Summary of external reviews and recommendations.

APPENDIX A - ATTACHMENT A

This attachment provides a crosswalk between the requirements for a GPMP and the GW/VZ Project documentation that will address the specific requirements. The GW/VZ Project will address the requirements through the *Project Specification*, the PMP, and the integrated baseline, which includes the DWP, implementation schedules, and supporting documents. Two designations have been included in the table:

"A" – designating where the requirement will be primarily addressed

"B" – designating where summary or additional information relative to the requirement can be found

CROSSWALK: GROUNDWATER PROTECTION MANAGEMENT PLAN (DOE ORDER 5400.1) AND THE INTEGRATED PROJECT DOCUMENTATION			
Requirements from DOE Order 5400.1	**Project Specification**	**Project Mgmt. Plan**	**Integrated Baseline**
1. Groundwater Protection Management Program.			
a) Document the groundwater regime with respect to quantity and quality.	B		A
b) Design and implement a groundwater monitoring program to support resource management and comply with applicable environmental laws and regulations.	B		A
c) Establish management program for groundwater protection and remediation, including specific Safe Drinking Water Act (SDWA), Resource Conservation and Recovery Act (RCRA) and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) actions.	A	B	B
d) Summarize and identify areas that may be contaminated with hazardous substances.	B		A
e) Provide for control of sources of these contaminants.	A	B	B
f) Provide for a remedial action program that is part of the CERCLA program required by DOE 5400.4.	A	B	B
g) Provide for decontamination and decommissioning, and other remedial programs contained in DOE directives.	A	B	B
2. Groundwater Monitoring Program.			
a) A Groundwater Monitoring Plan shall be developed as a specific element of all environmental monitoring plans and the Groundwater Protection Management Program. The Groundwater Monitoring Plan shall identify all DOE requirements and regulations applicable to groundwater protection and include monitoring strategy. The elements of the Groundwater Monitoring Program shall be specified (sampling plan, sampling, analysis, and data management), as shall the rationale and purpose for selecting these elements.			A
3. General Requirements of the Groundwater Monitoring Program			
a) Obtain data for the purpose of determining baseline conditions of groundwater quality and quantity.			A

Appendix A - GW/VZ Project Specification Annotated Outline

CROSSWALK: GROUNDWATER PROTECTION MANAGEMENT PLAN (DOE ORDER 5400.1) AND THE INTEGRATED PROJECT DOCUMENTATION			
Requirements from DOE Order 5400.1	**Project Specification**	**Project Mgmt. Plan**	**Integrated Baseline**
b) Demonstrate compliance with the implementation of all applicable regulations or DOE Orders.			A
c) Provide data to permit the early detection of groundwater pollution and contamination.			A
d) Identify existing and potential groundwater contamination sources and maintain surveillance of these sources.			A
e) Provide data upon which decisions can be made concerning land disposal practices and the management and protection of groundwater resources.			A
f) Site-specific characteristics shall determine monitoring needs.			A
***Technical Standard for GPMP**	**Project Specification**	**Project Mgmt. Plan**	**Integrated Baseline**
1. Establish overall site-wide groundwater protection and remediation goals.			
a) Write goal statements that provide specific, site-wide goals for setting and reviewing environmental objectives and targets; account for present and future uses of the groundwater resource; are measurable in terms of progress; and are documented, implemented, maintained, and communicated to appropriate DOE and contractor staff.	A		
b) Relate goal statements to site-specific groundwater and related conditions	A		
c) Determine whether the groundwater protection and remediation approach will be risk-based or resource-based	A		
d) Evaluate progress toward accomplishing the goals.			A
2. Ensure that all Federal, State, and other requirements are being met.			
a) Identify applicable requirements.	A		
b) Identify organizational unit responsible for compliance with these requirements.	B	A	
c) Establish procedures.		A	
d) Document decisions to ensure compliance.	B	B	A
3. Provide a mechanism for integrating groundwater protection with all site-wide operations.			
a) Coordinate site-wide programs affecting groundwater. These programs may include, but are not limited to, the following: waste management (including low-level waste performance assessment); environmental monitoring; environmental remediation; facilities and operations; underground storage tanks; future-use (e.g., land-use) planning; and water use and disposal.	B	A	B
b) Establish a work group or committee consisting of appropriate representatives of both DOE and contractors.		A	
c) Identify site-wide organizations and individuals with groundwater protection responsibilities.		A	
d) Establish regular communication mechanisms between all site-wide programs with groundwater responsibilities.		A	
e) Develop a site-wide self-assessment.		A	

Appendix A - GW/VZ Project Specification Annotated Outline

CROSSWALK: GROUNDWATER PROTECTION MANAGEMENT PLAN (DOE ORDER 5400.1) AND THE INTEGRATED PROJECT DOCUMENTATION			
Requirements from DOE Order 5400.1	**Project Specification**	**Project Mgmt. Plan**	**Integrated Baseline**
4. Identify potential sources of groundwater contamination.			
a) Establish a source-water protection program which: Sets priorities to identify sources of contamination and current or potential uses of groundwater; identifies current or potential uses of groundwater; identifies potential sources of contamination; and develops a system for ranking potential sources by degree of risk.	A	B	B
b) Inventory Class V miscellaneous injection wells.	B		A
c) Inventory injection wells under other classes.	B		A
d) Identify miscellaneous waste streams.	B		A
e) Identify location of potential contaminants relative to particularly valuable groundwater or to groundwater that is highly vulnerable to contamination.	B		A
5. Identify control strategies for preventing future contamination and remediating existing conditions.			
a) Identify control strategies for prevention of future contamination. Aspects of many programs may be relevant to preventing future groundwater contamination, e.g., pollution prevention; waste minimization; spills prevention, control, and countermeasures; well closure and abandonment; purge water management; and management of other investigation derived wastes. [Hanford Site Specific Comment: The Hanford Site Plan specifically references the Hanford Site Waste Minimization and Pollution Prevention Awareness Program Plan (DOE 1994) and addresses sanitary wastes and programs to cease soil discharge of waste streams.]	A	B	B
b) Identify control strategies for integration of waste management. [Hanford Site Specific Comment: The Hanford Site Plan discusses liquid effluent controls and State discharge permits.]	A	B	B
c) Identify control strategies for integration of environmental remediation. [Hanford Site Specific Comment: The Hanford Site Plan refers to two other strategy documents – the Hanford Site-wide Groundwater Remediation Strategy (Ford et. al. 1994), and the Hanford Past-Practice Strategy (Thompson 1991).]	A	B	B
6. Provide a network for monitoring groundwater quality.			
a) The design criteria used in developing the network should be clearly identified.	A		B
b) Data management and reporting systems should be maintained in a coherent site-wide manner.		A	
c) On-going management (assessment and modification) of the monitoring network is needed to address changing contaminant distributions, site conditions, and budgets.	B	B	A
d) Identify innovative monitoring techniques that have the potential to provide better quality and less expensive data.	B		A

Appendix A - GW/VZ Project Specification Annotated Outline

CROSSWALK: GROUNDWATER PROTECTION MANAGEMENT PLAN (DOE ORDER 5400.1) AND THE INTEGRATED PROJECT DOCUMENTATION			
Requirements from DOE Order 5400.1	**Project Specification**	**Project Mgmt. Plan**	**Integrated Baseline**
7. Provide basic technical data on subsurface conditions.			
a) Identify subsurface investigation data needs which support the groundwater monitoring, resource evaluation, waste management, and environmental remediation objectives.	A	B	B
b) Prioritize new studies and coordinate between areas or programs.		B	A
c) Identify or establish a subsurface studies information repository.		A	
8. Identify specific technical methods for site-wide use to achieve comparable groundwater information.			
a) Identify standard subsurface investigation methods used site-wide, ensuring comparable protocols with acceptable QA/QC procedures and which meet minimum data quality requirements.		B	A
b) Establish a process for adopting standard methods site-wide.		A	
c) Use best management practices where appropriate.		A	
d) Integrate procedures and information of methodology with database design.		A	
9. Incorporate site outreach program efforts into groundwater protection programs.			
a) Define and fund an outreach program.		A	B
b) Identify external audiences and their interests.		A	
c) Decide on methods of communication.		A	
d) Plan response system.		A	
e) Provide groundwater information to the interested parties.		A	
f) Provide meaningful opportunities to participate in the process of developing the GPMP.		A	

GPMP Standards Source: DOE Draft Guidance for Preparation of Groundwater Protection Management Plans

APPENDIX B

GW/VZ PROJECT MANAGEMENT PLAN ANNOTATED OUTLINE

APPENDIX B

GW/VZ Project Management Plan Annotated Outline

1.0 INTRODUCTION

This section will provide a summary overview of the PMP, its relation to other elements of the project hierarchy of documents, its structure and basic contents, and responsibilities for issuance and updates.

1.1 PURPOSE

This section will describe the basic purpose of the PMP (i.e., to define the roles, responsibilities, requirements, systems, processes, and other management tools needed to properly and consistently conduct project business for the assigned scope of work).

1.2 OBJECTIVES

This section will include a brief summation of the project's technical, schedule, cost, environmental, and safety objectives (to the extent these can be initially defined). These objectives will be consistent with the objectives stated in the project specification document, and as reflected in the project baseline documents.

1.3 ASSUMPTIONS

This section will identify the planning assumptions that underlie this management and integration project, with the goal of forming boundaries for the project's scope, organizational authorities, responsibilities, ties to other Hanford Site missions, site-wide priorities, funding bases, cost and schedule controls, communication, outreach (etc.). This section will also summarize key legal and regulatory requirements established by regulations, laws, codes, permits, agreements, DOE orders, and contractual obligations.

2.0 ORGANIZATIONAL ROLES AND RESPONSIBILITIES

This section will identify the main DOE and contractor organizations participating in this project, and will clearly define their basic roles, responsibilities, and interfaces in relation to the management and integration effort. The main organizations are as follows:

2.1 U.S. DEPARTMENT OF ENERGY

This section will briefly identify the key organizations in DOE's chain-of-command that are responsible for overseeing and participating in the Hanford Site GW/VZ Project. The roles and responsibilities of individual entities will be described in the following subsections.

2.1.1 Headquarters

This section will describe the responsible DOE-HQ organization, points of contact, roles and responsibilities relative to planning, reporting, implementation, and baseline control of the GW/VZ Project

2.1.2 Richland Operations Office

This section will describe, separately: a) the division of responsibility and authority within RL for the Hanford Site GW/VZ Project; b) the assignment of lead responsibility to and within the AME organization, and the relationship with BHI specifically for these project activities; c) the AME's site-wide management and integration role relative to other RL project organizations; and) the relationship with other internal elements of the AME team responsible for overseeing ER Project activities related to the GW/VZ scope.

2.2 HANFORD SITE CONTRACTORS

This section will briefly identify the Hanford Site contractor organizations responsible for managing, integrating, and participating in the Hanford Site GW/VZ Project. The roles and responsibilities of individual entities will be described in the following subsections.

2.2.1 Bechtel Hanford, Inc.

This section will describe BHI's site-wide management and integration role for the GW/VZ Project. It will address BHI's relationship to Hanford Site projects, along with those contractors whose activities are included in or closely related to the GW/VZ Project scope, Tribal Nations, various stakeholders, and other involved parties. The narrative will also explain the distinction between the GW/VZ management function assigned to BHI, and those elements of the Hanford ER Project team responsible for performing ER Project activities. Examples of the latter are groundwater monitoring and remediation, solid and liquid waste site characterization and remediation, decontamination and demolition of buildings and other structures, and surplus facilities surveillance and maintenance activities.

2.2.2 Fluor Daniel Hanford, Inc.

This section will summarize FDH's participation in the GW/VZ Project team, and FDH's oversight role with regard to those Hanford Site projects and PHMC organizations whose activities actually or potentially impact the GW/VZ. The section will focus on basic interfaces with BHI relative to this project.

The following subsections will provide brief descriptions of the specific roles, responsibilities, and interfaces for each PHMC subcontractor relative to the GW/VZ Project:

2.2.2.1 Tank Waste Remediation Systems Contractor

2.2.2.2 Waste Management Contractor

2.2.2.3 Spent Nuclear Fuels Contractor

2.2.2.4 Facility Stabilization Contractor

2.2.2.5 Site Infrastructure Contractor

2.2.3 Pacific Northwest National Laboratory

This section will describe PNNL's roles, responsibilities, and organizational interfaces relative to the project mission, the GW/VZ integration contractor, and other GW/VZ Project participants. Ongoing PNNL activities directly related to this project's scope include groundwater monitoring, groundwater modeling, and associated scientific/technological work.

2.3 REGULATORY AGENCIES

This section will describe the roles, jurisdictional authorities, and interfaces of the U.S. Environmental Protection Agency (EPA) and Washington State Department of Ecology (Ecology) relative to RL and assigned contractors in the performance of the GW/VZ Project. It will describe the oversight/compliance basis and processes that will be applied (e.g., RCRA, CERCLA, TPA and associated milestones, etc.).

2.3.1 Jurisdictional Authorities

2.3.2 Oversight and Compliance Processes

3.0 SYSTEMS ENGINEERING APPROACH

This section will describe the general systems engineering approach that is an integral part of the planning, engineering, and execution under the Richland ER Project. Additionally, this section will describe the project team's interfaces with the Hanford Site Systems Engineering function.

4.0 MANAGEMENT CONTROL SYSTEM AND PROCESSES

4.1 PROJECT CONTROL SYSTEM

4.1.1 Work Breakdown Structure

This section will provide a description of the WBS to the cost account level, and will provide a graphical display of the associated code of accounts.

4.1.2 Responsibility Assignment Matrix

This section will provide a matrix of the responsible individuals, down to the cost account level.

4.1.3 Project Baseline Definition

4.1.3.1 Technical Baseline

This section will provide a summary of the project work scope at the cost account level.

4.1.3.2 Schedule Baseline

This section will provide a summary of the project schedule at the cost account level for the three year DWP window. Additionally, this section will provide the life cycle schedule.

4.1.3.3 Cost Baseline

This section will provide a summary of the project cost at the cost account level for the three year DWP window. Additionally, this section will provide the life cycle cost.

4.1.4 Project Work Authorization

This section will describe the work authorization process for both the fiscal year and for the changes that occur during the fiscal year.

4.1.5 Change Control

This section will describe the overall change control process and thresholds for the project. Additionally, the interface with the overall Hanford Site change control process will be provided.

4.1.6 Funds Management

This section will describe the overall control process for management of funds between RL and contractors.

4.1.7 Reporting Requirements

This section will describe the monthly, quarterly, and annual reporting requirements for the project and site contractors.

4.2 MANAGEMENT REVIEWS

This section will describe the management review processes for the project team, including RL and HQ.

4.2.1 Routine Meetings (internal to the project)

4.2.2 Performance Status Reviews

4.2.3 Commitment and Action Item Tracking

5.0 TECHNICAL PEER REVIEW PROCESS

This section will describe the technical peer review process that will be used to ensure that highly qualified scientific, technical, and engineering expertise is applied to the planning and performance of project tasks, and attainment of project technical objectives.

6.0 TECHNICAL DATABASE MANAGEMENT

This section will provide a list of the technical databases associated with the project, along with the purpose, description, inputs, outputs, and responsible project for each of the databases.

7.0 PROCUREMENT OF SERVICES

7.1 PURCHASE AGREEMENTS WITH HANFORD SITE CONTRACTORS

7.1.1 Services Performed by the PHMC or its Subcontractors

This subsection will briefly describe the existing mechanism between FDH and BHI for requesting and receiving services, including performance and payment. It will reference the current MOA between the two contractors for these purposes, and the applicability of the MOA to the FDH major subcontractor and enterprise companies.

7.1.2 Services Performed by PNNL

This subsection will briefly describe the existing Hanford Site mechanism used by PNNL and BHI for requesting and receiving services, including performance and payment.

7.2. PROCUREMENT FROM OTHER SOURCES

7.2.1 Subcontracts/Consulting Agreements

7.2.2 Requests for Off-Site Service

8.0 DOCUMENT CONTROL AND RECORDS MANAGEMENT

This section will describe the process and systems to be used for GW/VZ Project document control and records management. It will identify specific responsibilities for RL, BHI (the lead integrator), and participating organizations. The section will include descriptions of processes for general document generation, review, and approval protocols; project signature authorities; and records retention requirements that pertain to the scope of this project.

8.1 PROJECT-RELATED CORRESPONDENCE

This section will address those forms of project-related business communication prepared by project participants and intended for record, both internal (between project participants, and external (on behalf of the integrated project). This section will also address the disposition of incoming correspondence and messages (memoranda, letters, electronic mail, etc.) from external sources.

8.1.1 Internal (between project participants)

8.1.2 External (outgoing or incoming, on behalf of the integrated project organization)

8.2 REPORTS, PUBLICATIONS, AND OTHER TECHNICAL AND ADMINISTRATIVE DOCUMENTATION

This section will address routine project status, performance, and technical reports; plans, evaluations, assessments; miscellaneous other publications; data file records; calculations, estimates, and related backup materials appropriate for retention in project files.

9.0 COMMUNICATIONS

This section will identify information queries/responses, announcements, and general communications relative to or on behalf of the RL project mission and scope of work with RL organizations; Hanford Site contractors; other DOE entities and affiliated contractors; other local, state, and federal government branches, agencies, offices, and committees; representatives of public or private interest, advocacy, or business groups.

9.1 SITE INFORMATION ANNOUNCEMENTS

9.2 NEWS RELEASES AND MEDIA RELATIONS

9.3 PUBLICATIONS, PAPERS, AND PRESENTATIONS

9.4 OTHER INTERACTIONS

10.0 REFERENCES

APPENDIX C

GW/VZ PROJECT TRIBAL GOVERNMENT CONSULTATION AND PUBLIC INVOLVEMENT PLAN ANNOTATED OUTLINE

APPENDIX C

GW/VZ Project Tribal Government Consultation and Public Involvement Plan Annotated Outline

1.0 OVERVIEW

Protection of the Columbia River is a strong value that is shared by the Tri-Party Agencies, the Tribal Nations, stakeholders, and the general public. The importance of protecting the groundwater and the Columbia River was documented in the final report of the Hanford Future Sites Uses Working Group (FSUWG) and the Hanford Tank Waste Task Force report. The Hanford Advisory Board conveyed to the Tri-Party Agencies that the values adopted by the Hanford FSUWG and the Tank Waste Task Force should be adhered to in the overall Hanford Site Cleanup Program. Responding to public concerns regarding protection of the Columbia River, the Tri-Party Agencies refocused the ER Project by assigning high priority to clean up of waste sites along the river.

1.1 PURPOSE

The need for site-wide integration of the GW/VZ work has evolved from a heightened awareness of vadose zone contamination impacting the Hanford Site groundwater and, ultimately, the Columbia River. RL has directed BHI to develop a GW/VZ integration plan in order to manage activities and issues associated with Hanford GW/VZ contamination. Tribal Government consultations and a public involvement component are important parts of the GW/VZ integration process.

There are two primary reasons for the Tribal Government and public involvement consultation efforts associated with GW/VZ integration. The first is to provide a communication channel for Tribal Nations and stakeholders to maintain a timely understanding of plans and progress concerning GW/VZ integration issues. The second is to identify and develop opportunities where the Tribal Nations and stakeholders feel their advisory inputs would most benefit GW/VZ integration activities.

1.2 GOALS/OBJECTIVES

The immediate goals of GW/VZ Tribal Government consultation and public involvement efforts are to engage interested members of Tribal Nations and the public in a dialogue on GW/VZ issues by creating opportunities for early and meaningful input to the integration planning process.

1.3 AUDIENCES

Interested audiences include but are not limited to state and federal agencies, Tribal Nations, the Oregon Office of Energy, Hanford Advisory Board, Natural Resources Trustee Council, county

officials including Adams, Benton, Franklin, Grant, Morrow and Umatilla counties; community organizations, stakeholders, employees, and other interested publics.

1.4 TRIBAL GOVERNMENT CONSULTATION STRUCTURE

The Tribal Nations are a unique component of interested audiences on the Hanford Site. They will be involved through government-to-government consultations. The Tribal Government consultations will be coordinated through the RL Indian Nations Program Manager. These consultations will be conducted when formal input is sought or information is available.

1.5 TRIBAL GOVERNMENT CONSULATIONS AND PUBLIC INVOLVEMENT PROCESS

The GW/VZ Project understands the responsibility it has to involve the Tribal Nations and the public in the GW/VZ integration effort, because decisions made by the project could affect the Columbia River, which is a regional resource. The structure of the GW/VZ integration public involvement effort is designed to facilitate the public's meaningful involvement in GW/VZ integration planning.

The GW/VZ integration process includes, as a fundamental principle, the involvement of Tribal Nations and stakeholders early and regularly in integration activities. Tribal Government consultations and public involvement efforts will have two stages. In the first stage, a process will be developed with Tribal Nations and stakeholders to identify preferred communication channels and seek their involvement, values, and advice for consideration in major GW/VZ Project planning components (such as the mission, vision, goals, objectives, success criteria and the *Tribal Government Consultation and Public Involvement Plan*). Given the diverse audience represented by Tribal Nations and stakeholders, and the proposed planning time frame for the GW/VZ Project, existing government-to-government consultations, presentations to stakeholder groups, and a facilitated workshop appear as viable possibilities for obtaining and reflecting Tribal Nation and stakeholder values in the underlying principles of the GW/VZ Project.

Working with Tribal Nations and stakeholders, a *Tribal Government and Public Involvement Plan* will be developed for the GW/VZ integration effort. The plan will identify specific involvement opportunities preferred by the external entities. Tribal Nation and stakeholder guidance for other major planning documents will be sought through a facilitated interactive format that will enable interested parties in the Northwest region to provide input.

The second stage will involve providing updates to Tribal Nations and stakeholders and seeking input when major documents are revised. Updates will be provided through a newsletter, an Internet web site, presentations, or other means.

1.6 ACTIVITIES

Phase I - December 3, 1997 - February 13, 1998

Phase I involves initial research and solicitation of individuals from Tribal Nations and stakeholder groups to understand their values and concerns related to GW/VZ integration. Tribal Nation and stakeholder research during this phase was conducted through one-on-one meetings with interested individuals to receive input on their views of the GW/VZ issues and what they perceive as a successful GW/VZ integration process. The interview information was considered in the development of this initial GW/VZ planning approach.

Phase II – March 3, 1998 – September 30, 1998

Phase II activities include inviting Tribal Nations and stakeholders to participate on development of major project planning components, including the mission, vision, goals, objectives, and success criteria, and the *Tribal Government Consultation and Public Involvement Plan*. Through development of an interactive forum, such as a facilitated workshop, Tribal Nation and stakeholders can express the values to be reflected in the underlying principles of the project. The *Public Involvement Plan* will outline the roles of Tribal Nation and stakeholder involvement, as well as identifying specific involvement opportunities preferred by the external audiences. Tribal Nation and stakeholder guidance for other major planning documents will be sought through a real time, interactive process that will enable interested parties in the Northwest region to provide input. Recognizing that varied input may be received from Tribal Nations and stakeholders, the project will resolve comments through the most efficient regulatory process.

Concurrent with this interactive effort, periodic updates will be provided to Tribal Nations and stakeholders on the status of major documents and the opportunities for public involvement. Updates will be provided through such media as a newsletter, an Internet web site, and presentations.

2.0 RESPONSIBILITIES

The GW/VZ Project team will perform the GW/VZ Tribal Government consultations and public involvement activities in coordination with the RL Office of External Affairs.

APPENDIX D

HANFORD'S GW/VZ SCIENCE AND TECHNOLOGY APPROACH

APPENDIX D

Hanford's GW/VZ Science and Technology Approach

1.0 INTRODUCTION

The GW/VZ Project will develop a science and technology approach that supports cleanup decisions and actions resulting in the protection of groundwater and the Columbia River. The approach will be based on technology roadmapping principles. Road maps are tools used to make science and technology (S&T) investment decisions that ensure S&T investments are focused on critical path problems and will deliver solutions according to established schedules. The Hanford Site's GW/VZ S&T roadmaps will allow the GW/VZ Project to accomplish the following:

- Identify high risk activities or contaminant sources and their potential impacts to the vadose zone, groundwater, and the Columbia River.
- Make highly focused S&T investments addressing specific risks and/or uncertainties.
- Integrate S&T needs among all the Hanford Site's projects, and identify S&T gaps.
- Define and prioritize future S&T investments based on critical path information, value of information, and programmatic (performance, schedule, etc.) risk.

The GW/VZ S&T roadmaps focus on projects with high risk and uncertainty. Projects that are near completion or entail low cost and risk are not included. S&T roadmapping efforts are focused on activities that fall into four categories:

- Activities that materially reduce uncertainty in estimates of contaminant transport through the vadose zone-groundwater system to the Columbia River and the subsequent impacts.
- Activities that are on the Hanford Site's critical path to closure, and which entail medium-to-high risk because technology is not identified, available, or is unproven.
- Activities involving contaminant sources with high technical risk and moderate-to-high cost, regardless of schedule.
- Activities that are high-cost and long-term regardless of identified risk.

This approach helps ensure that S&T investments produce information and breakthroughs needed to reduce cost and safely remediate the Hanford Site.

Throughout the S&T roadmap development and implementation, Tribal Nations, stakeholders, and regulators will be participate in the planning process. (See Section 3.4 for additional information.)

2.0 GW/VZ PROJECT LOGIC, AND SCIENCE AND TECHNOLOGY ROADMAP DEVELOPMENT

The GW/VZ Project logic and approach to S&T roadmap development are summarized in Figure D-1. Section 2.1 addresses the inputs to the GW/VZ S&T roadmapping process. Section 2.2 addresses the breakdown of the Applied Science and Technology Roadmap Development Activities logic. Sections 2.3 through 2.5 provide detail on the roadmapping process. Section 2.6 addresses implementation.

2.1 DEVELOPMENT OF THE HANFORD SITE GW/VZ SCIENCE AND TECHNOLOGY ROADMAP

A GW/VZ Applied Science and Technology Roadmap will be developed to effectively manage fundamental uncertainties associated with vadose zone management and groundwater stewardship. These uncertainties derive from three sources:

1. **Requirements and Issues.** Unresolved cleanup (regulatory) requirements and end states severely limit impacts. The regulators' ability to define end states is likewise limited by the lack of high certainty impact assessment.

2. **System Models.** System models, such as vadose zone/groundwater models, are not sufficiently developed to understand the inventory, fate and transport, risks, and river impacts of site contaminants in the physical system itself.

3. **Project Activities and Decisions.** At the present time, it is not fully known how operating, remediation, and planning decisions (and assumptions) affect, or will affect, the vadose zone and groundwater.

The GW/VZ Project will implement a process through which a team of technical experts will establish the "needs" or "requirements" for applied science and technology. The GW/VZ Project will use roadmapping to document the additional S&T information required to generate an effective understanding of the vadose zone, and to ensure a scientific basis for supporting near-term and long-term decisions affecting GW/VZ activities. The roadmaps will address key uncertainties, identify what investigations will help resolve those uncertainties, and support the plan for delivering results to decision makers.

2.2 SCIENCE AND TECHNOLOGY ROADMAP DEVELOPMENT LOGIC

To be successful, the S&T roadmapping process must clarify and respond to the central uncertainties affecting the site's ability to effectively manage the vadose zone. The uncertainties

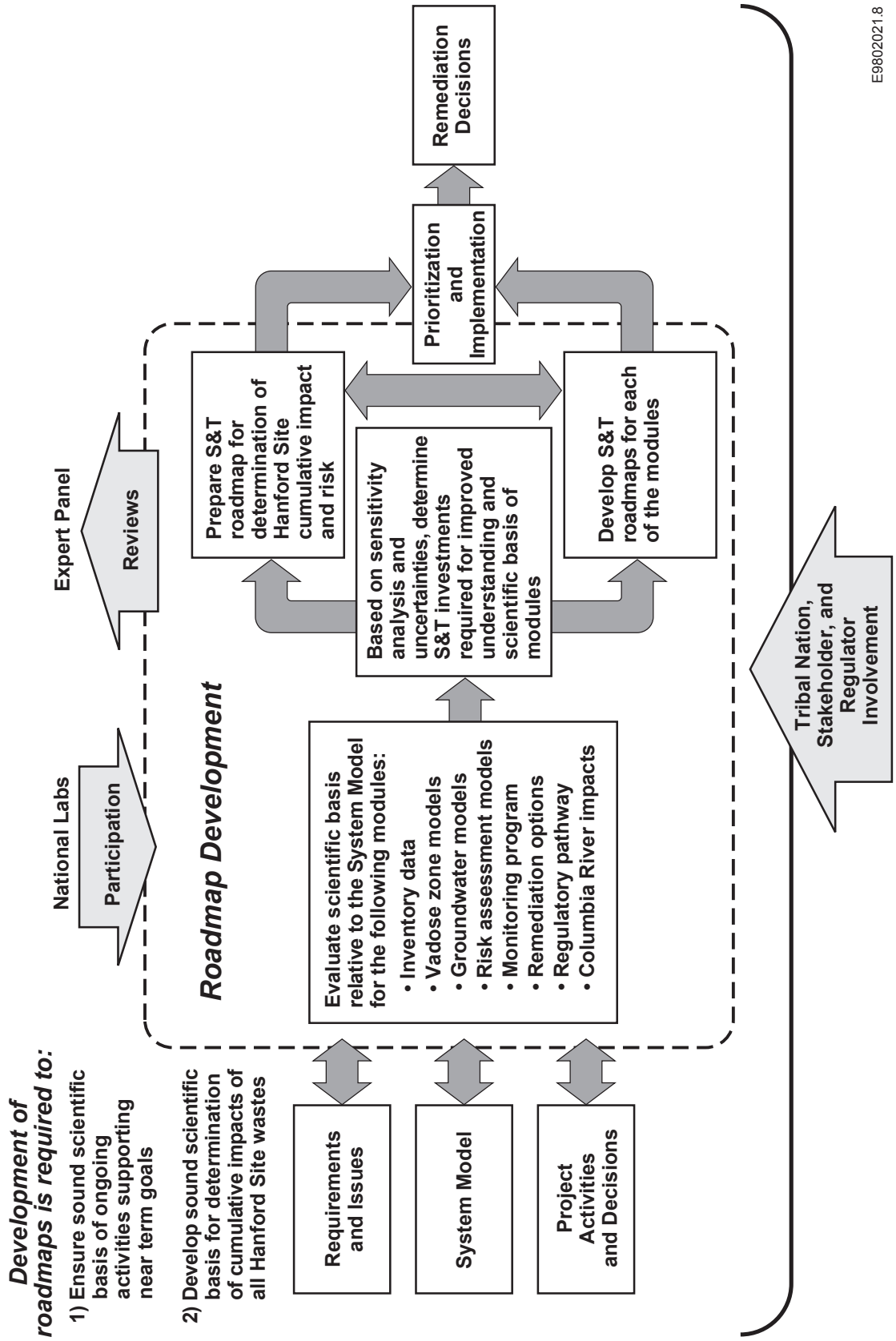


Figure D-1. The GW/VZ Science and Technology (S&T) Roadmap Development.

associated with requirements, models, and decisions are fundamentally related and include the following:

- New information or capabilities required to develop a technically credible model of the physical system, including a description of the relevant site inventory entering and affecting that system.

- Site decisions or assumptions that have the greatest impact on how the site manages that system.

- The level of model resolution that is required to effectively support resolution of those decisions and assumptions.

2.2.1 Requirements/Issues

Numerous requirements, recommendations, issues, and values have been provided by technical reviewers, Tribal Nations, stakeholders, and regulators relative to GW/VZ activities. These include the CRCIA report. These inputs are being compiled and summarized to ensure that they are being addressed in the roadmapping process.

The roadmapping process will articulate the technical issues that must be resolved in order to a) generate the effective conceptual model; and b) manage decisions that will impact the vadose zone, groundwater and the Columbia River.

2.2.2 System Model

The factors controlling contaminant inventory, fate and transport, risks, and Columbia River impacts of site contaminants in the physical system itself are not fully understood. In developing this understanding, it is as important to articulate what is and is not known (including degrees of uncertainty). In addition, unresolved assumptions about cleanup requirements and end states significantly complicate an appropriate assessment required for vadose zone impacts (that impedes regulators' ability to resolve those end states).

The system model is comprised of the following:

1. A specification, describing what the model's functions and performance.

2. A conceptual model that describes the features and processes that must be addressed for the model to meet the specification.

3. A quantitative representation of the conceptual model features and their associated uncertainty (e.g., site stratigraphy and associated hydrologic parameters influencing vadose zone transport).

4. A mathematical representation (numerical code) of the physical and chemical system that incorporates processes required to appropriately represent the system.

The specification will be for the minimal credible model. This will define (broadly) the components of the model and the minimum level of detail required in each model component. The minimum credible model will represent the collective product of the subject matter experts involved in the roadmapping. It will form the baseline that will be revised as new information is developed.

An output of items 3 and 4 above is description and visual representation of the physical system, including an accounting of the inventory of material entering and moving through the vadose zone (source terms). The visual representation is used to communicate what is and is not known (uncertainty and sensitivity analysis), and to show how levels of understanding change as a result of information obtained.

The roadmapping process will review, validate, or revise each element of the conceptual model, specify what assumptions need resolution to realize the model, and articulate the S&T necessary to develop a credible model. The results, or success, of S&T activity performed against the roadmap will be measured in terms of changes to and an improved understanding of the model.

2.2.3 Project Activities and Decisions

How operating, remediation, and planning decisions affect, or will affect, the vadose zone and groundwater are not fully understood. It is imperative that the project identify these "impact decisions," understand (on the basis of early modeled results) which of these account for most of the activity in the vadose zone, and then derive the information required to provide a sound scientific basis for those decisions. Currently a preliminary site system model exists (i.e., the composite analysis) that will serve as point of departure for developing the ability to drive decisions based on modeled impacts.

The roadmapping process will review and validate how planned site actions will impact the GW/VZ, establish the relative importance of these actions (based on projected impact), confirm the scope of the critical actions, and specify the S&T needed to support them.

2.3 SITE ASSESSMENT METHODOLOGY

In order to most effectively collect, develop, and integrate the understanding needed to develop a credible conceptual model, the effort is organized around eight modules. These are as follows:

1. Inventory Data
2. Vadose Zone Models
3. Groundwater Models
4. Risk Assessment Models
5. Monitoring Program
6. Remediation Options

7. Regulatory Pathway
8. Columbia River Impacts

The evaluation and development of S&T needs for each module is an interactive process that will involve participation by the national laboratories and review with the technical expert panels.

The methodology for reducing uncertainties and identifying where the application of science will most benefit the goals of the project is outlined in this appendix. Generally, the minimal credible system model and current project schedules will identify the site actions and decisions most relevant to managing the vadose zone. An examination of those actions and decisions will identify the information that must be generated to ensure resulting actions and decisions are scientifically and technically based. Then, an examination of those information requirements will suggest ways in which the system model must be evolved to enhance our understanding of the potential impacts of actions on the groundwater and the Columbia River. The approach is iterative. Each step, below, involves sensitivity and "value of information" analyses to clarify what information is most relevant for making sound decisions.

- Identifications of decisions
- Identification of decision drivers/issues
- Model and information requirements
- Summary requirements and prioritization
- Model and information improvements.

2.4 PREPARE ROADMAPS

The results of the sensitivity and uncertainty analysis will be used to develop S&T roadmaps for each of the modules. The resources of the national laboratories will assist in the preparation of S&T roadmaps. The roadmaps will accomplish the following:

- Identify high risk activities and the impacts of failure.

- Focus the S&T efforts to ensure that needs are met and results delivered in a timely manner.

- Integrate or eliminate overlapping S&T efforts and fill requirement gaps.

- Provide the basis for defining future S&T investments based on costs, critical project decisions and risks.

As the S&T needs are identified they will be linked to the existing Science and Technology Coordinating Group needs and communicated the S&T community.

A primary objective of the GW/VZ Project is to develop a sound scientific basis for determination of the cumulative impacts of all Hanford Site wastes. Based on the analysis results, the roadmaps for the individual modules (and a composite roadmap) will be prepared to

provide the architecture for assessing cumulative impacts and allocation for risk to each of the projects.

2.5 IMPLEMENTATION

As both the individual module roadmaps and composite roadmap are developed, the S&T requirements will be incorporated into the planning and budgeting process through the development of detailed work plans. The S&T requirements will first be prioritized relative to the GW/VZ Project and then incorporated into the Hanford Site *Integrated Priority List*. Based on this prioritization and the associated funding constraints, the detailed work plans to achieve the project objectives will be prepared and implemented.